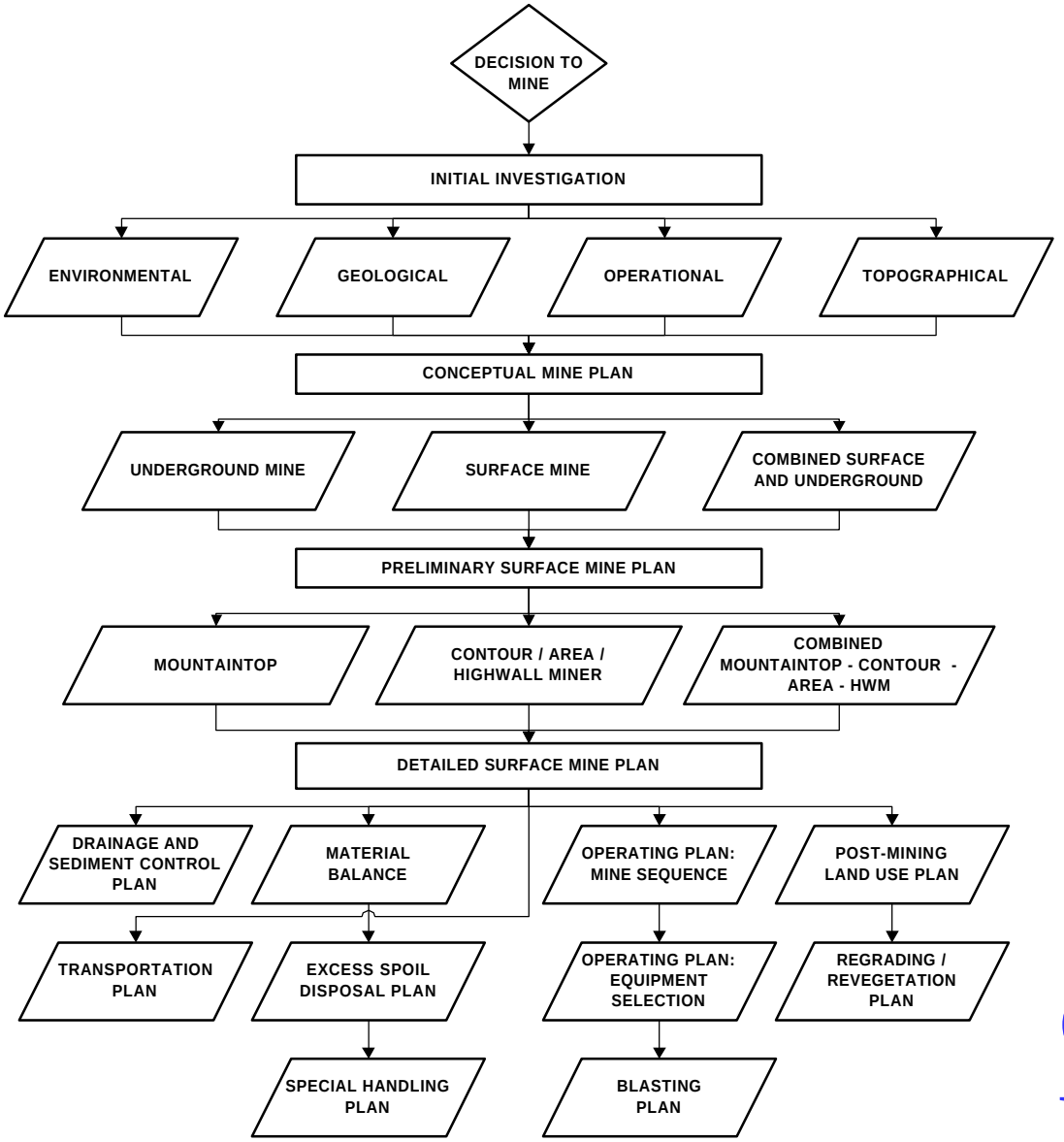
A West Virginia Mining Case Study

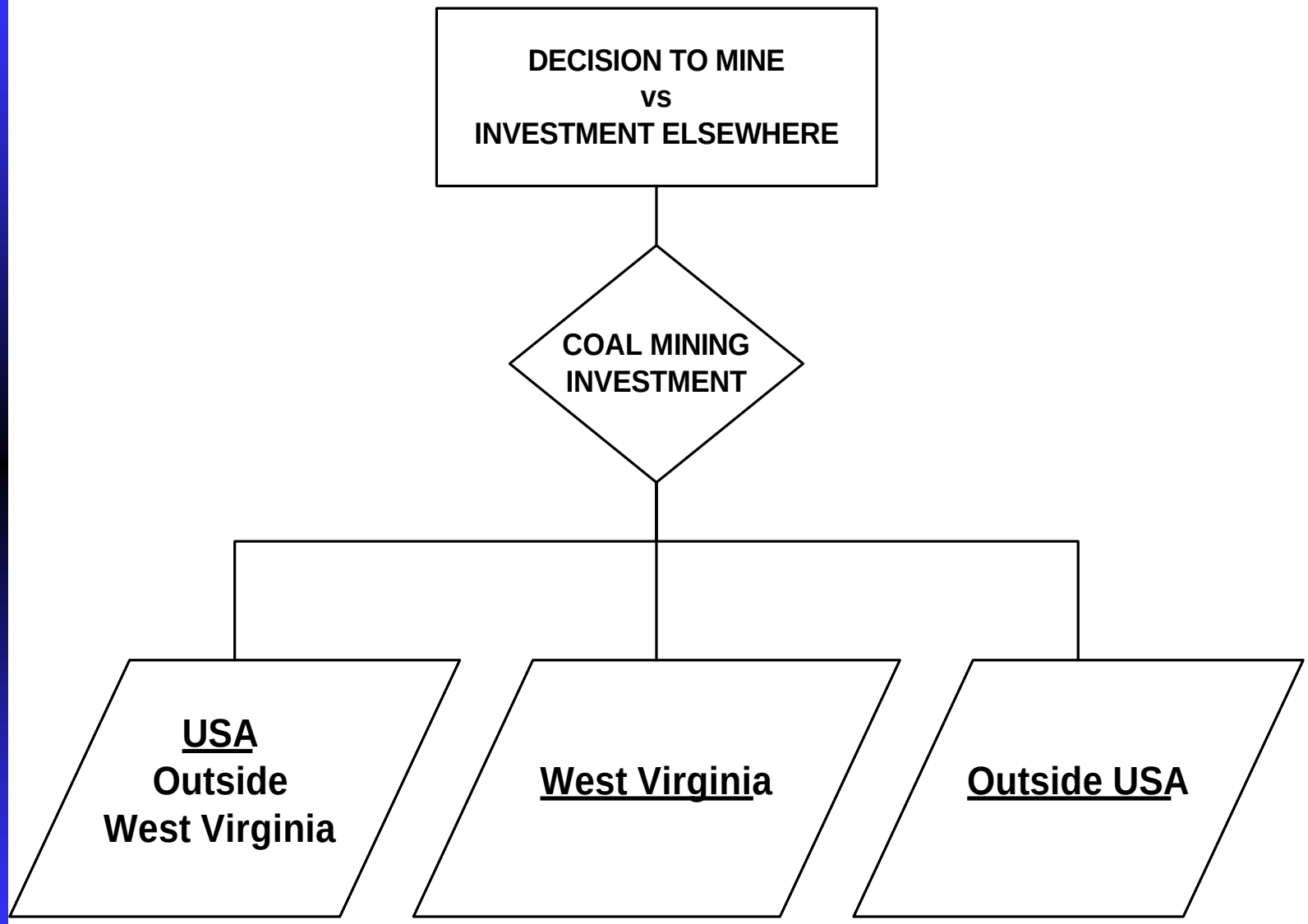
The Decision-Making Process Related to Coal Mining

Presented to EIS Symposium

June 24, 1999



Overall Decision Process


DECISION TO MINE
vs
INVESTMENT ELSEWHERE
COAL MINING
INVESTMENT
USA
Outside
West Virginia
West Virginia
Outside USA

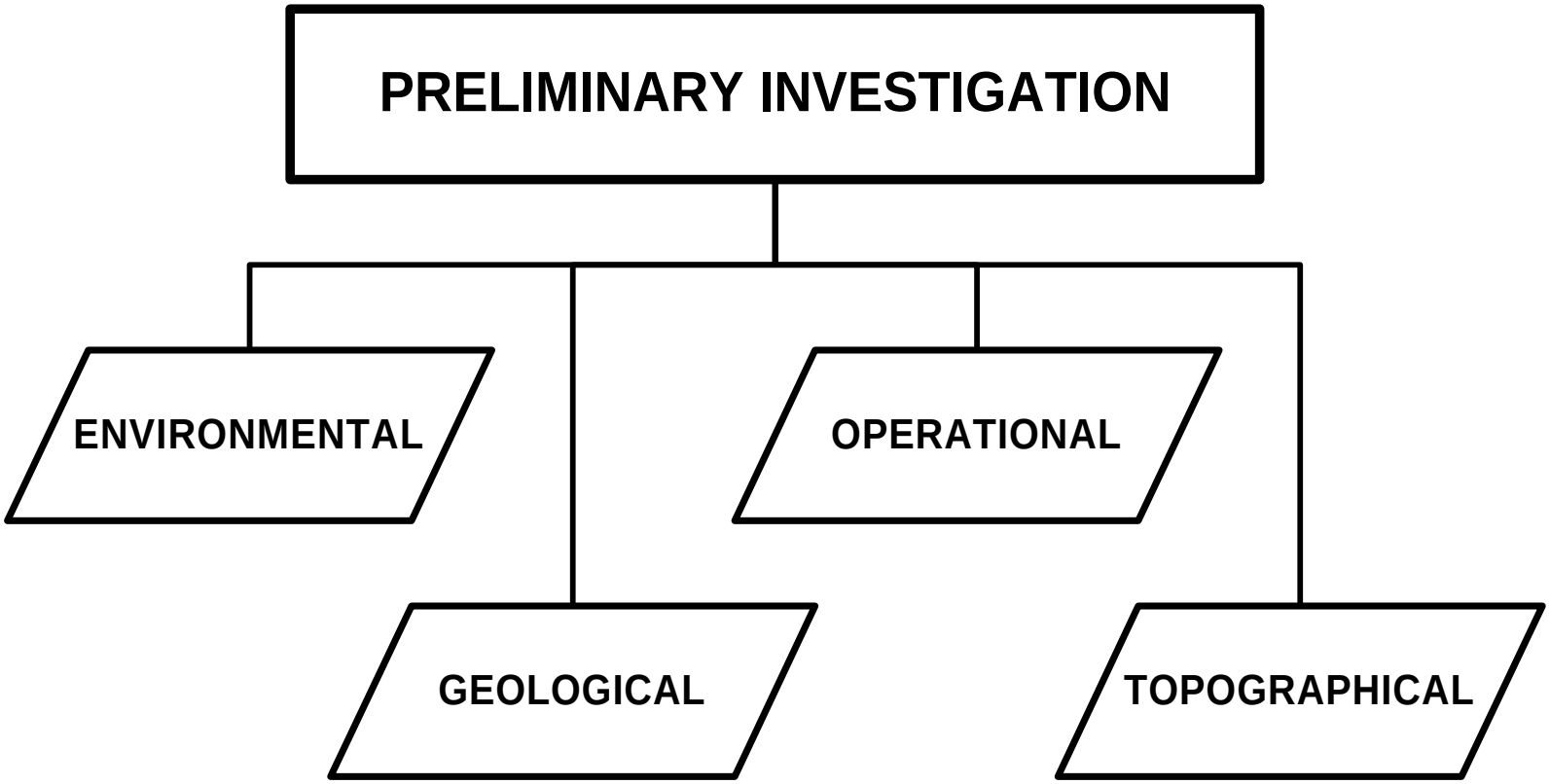
Mining Options

USA Outside West Virginia	West Virginia	Outside USA
Other Appalachia	Southern WV (Low Sulfur)	Colombia
Wyoming		Venezuela
Utah	Northern WV (High Sulfur)	Australia
Colorado		South Africa
Other		Other

Preliminary Investigation

Definition of Key Characteristics of Multiple Reserves

Required for Valid Comparison of Competing Opportunities


PRELIMINARY INVESTIGATION
ENVIRONMENTAL
OPERATIONAL
GEOLOGICAL
TOPOGRAPHICAL

ENVIRONMENTAL

- Unique Aquatic or Terrestrial Habitat
- Endangered Species
- Special Characteristics
- Water Quality
  - Existing Acid Mine Drainage (AMD)
  - TMDL (Upcoming)
- Proximity to Residents / Communities
- Archeological, Historic, Cultural Features

Environmental Factors

- Hydrology
  - Surface Water
    - Six Months Data
      - Flow, pH, TSS, Iron, Mn, Alkalinity, Acidity, Aluminum, TDS, Spec. Conductance, Sulfates
  - Ground Water
    - 0.7 mile groundwater user inventory
    - Aquifer Delineation and Usage
      - Depth, TSS, pH, Iron, Mn, Acidity, Alkalinity, Specific Conductance, Sulfates, TDS
      - Existing Treatment, If any

Environmental Factors

Collect Data to Evaluate

- Probable Hydrologic Consequences
- Hydrologic Regime Effects
  - Avoid AMD and Material Damage
  - Treatment Plan if AMD Occurs
  - Avoid TSS to Receiving Streams
  - Water Rights Protection
  - Hydrologic Balance in Project Area

GEOLOGICAL

- Stratigraphy
- Coal Seam Thickness
- Coal Quality
- Overburden Types (Sandstone, Shale, Other)
- Overburden Quality
  - Acid Base Accounting
  - Slake Durability
  - Strength

Geology

- Regional Data
  - County Reports
  - Reports on Adjacent Property
- Site Specific Data
  - Drilling Records
    - Geophysical (Electric) Logs
      - Resistivity, Density, and Water Level
    - Geologist Logs
    - Driller's Logs

Overburden Data

- Acid-Base Accounting
- RQD (Rock Quality Designation)
- Percent Clays
- Percent Sulfur
- Forms of Sulfur
- Alternative Topsoil Analysis
- Slake Durability

Classification of Reserves

Proven

- Area of Influence Less than 1320 feet

Probable

- Area of Influence 1320 feet to 2560 feet

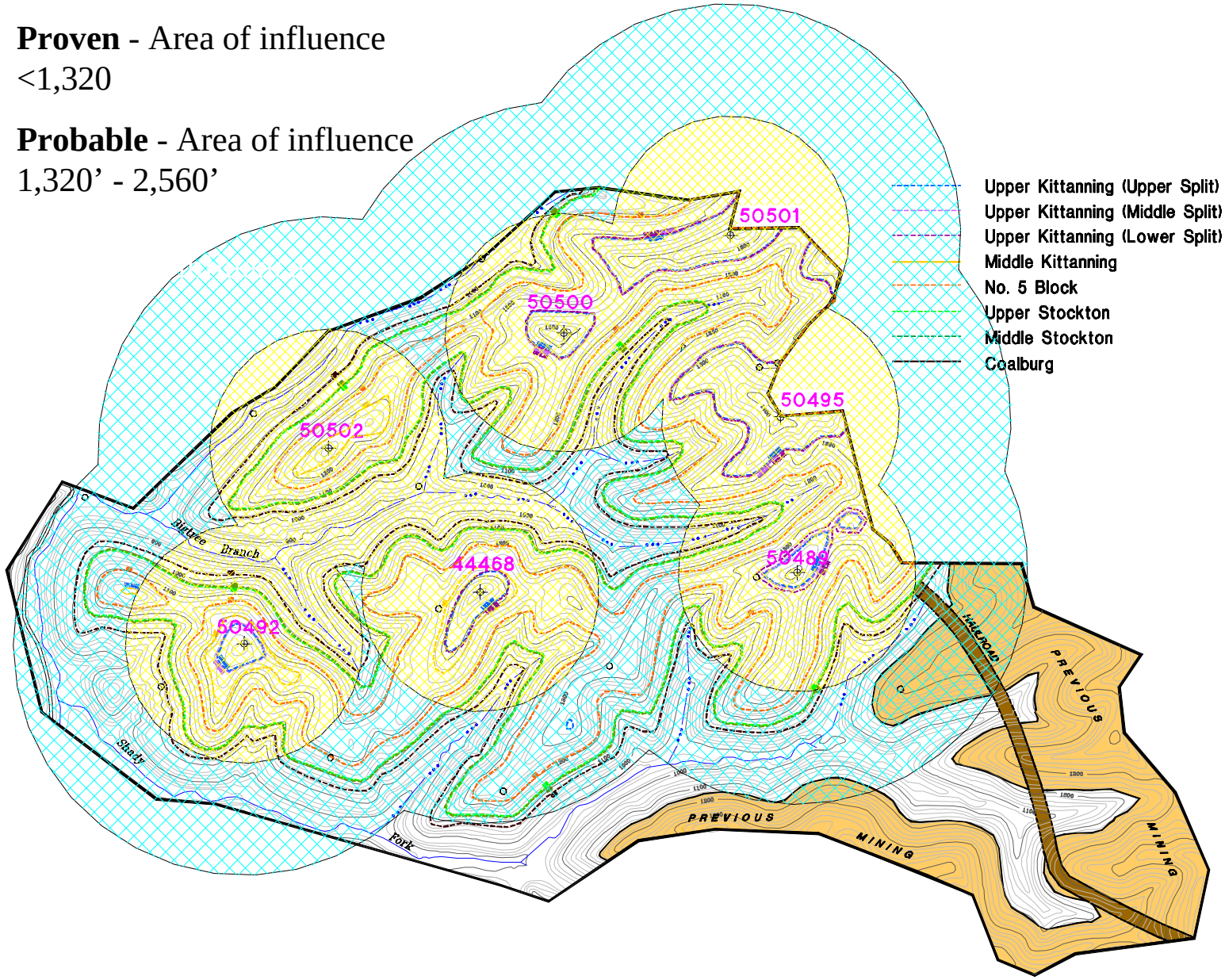
Inferred

- Area of Influence Greater than 2560 feet

Reserve Classification

Proven - Area of influence
<1,320

Probable - Area of influence
1,320’ - 2,560’

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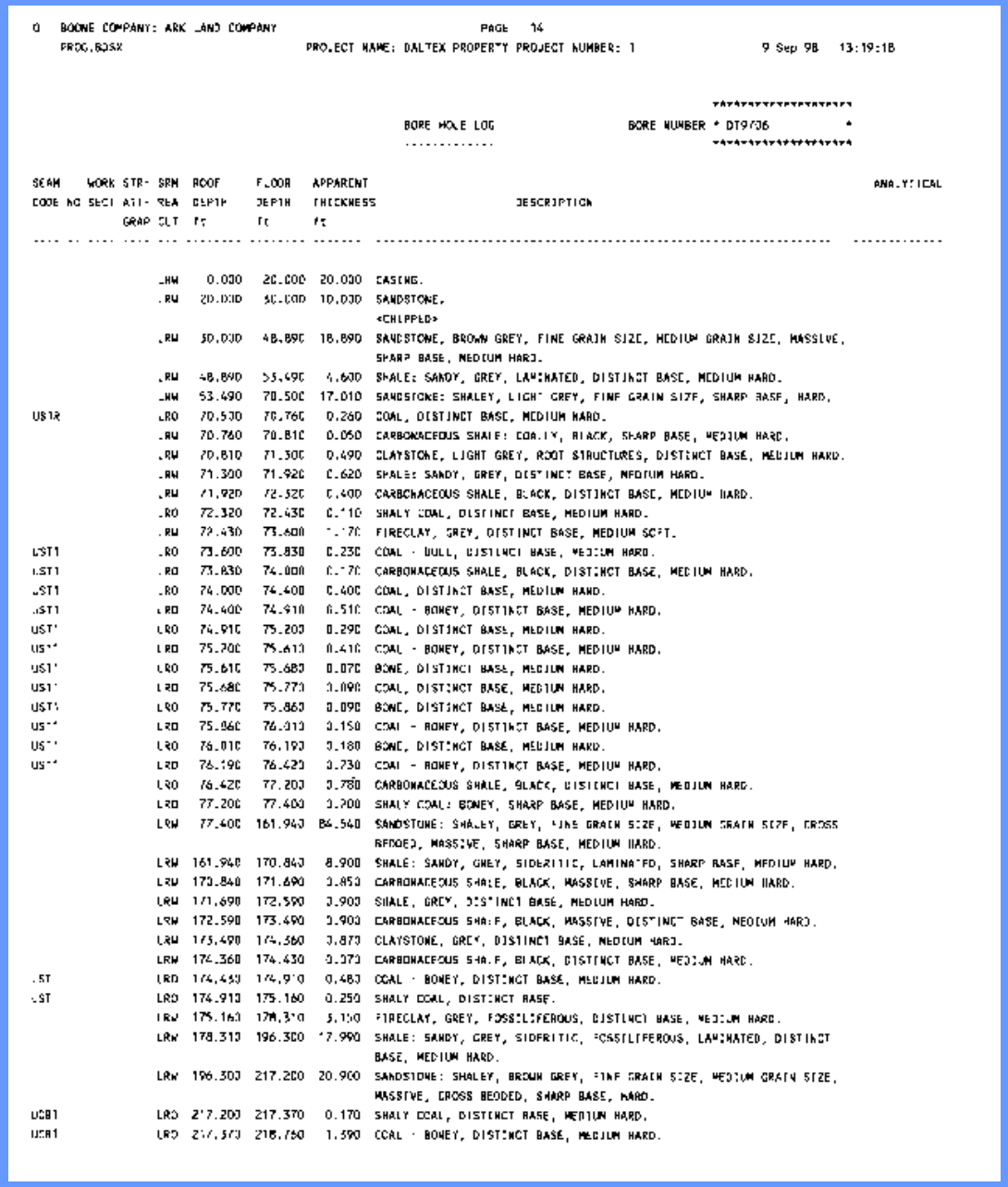
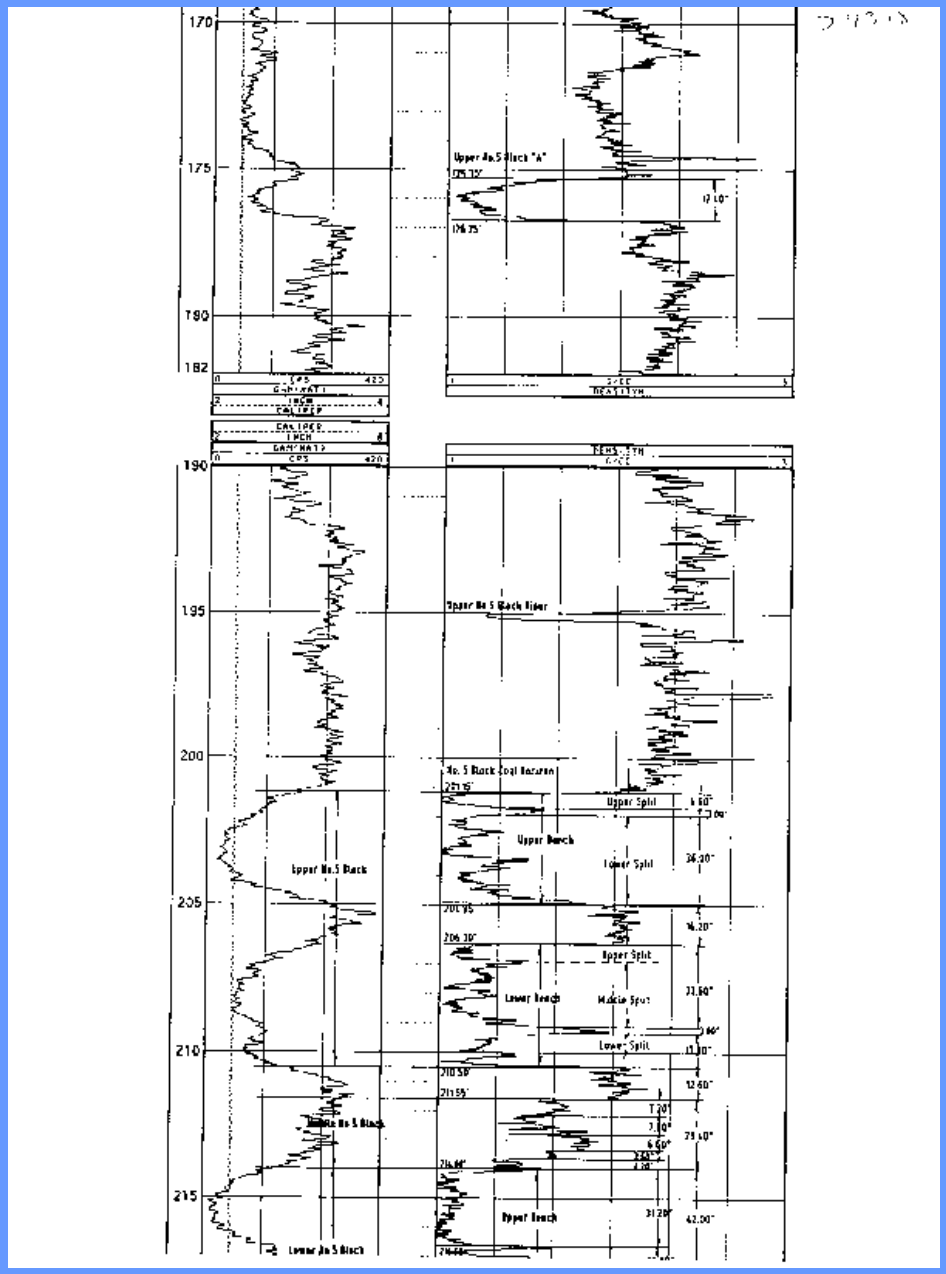


0 BOONE COMPANY: ARK LAND COMPANY PAGE 14
PROG.BOSX PROJECT NAME: DALTEX PROPERTY PROJECT NUMBER: 1 9 Sep 98 13:19:18

BORE HOLE LOG BORE NUMBER * DT9706 *

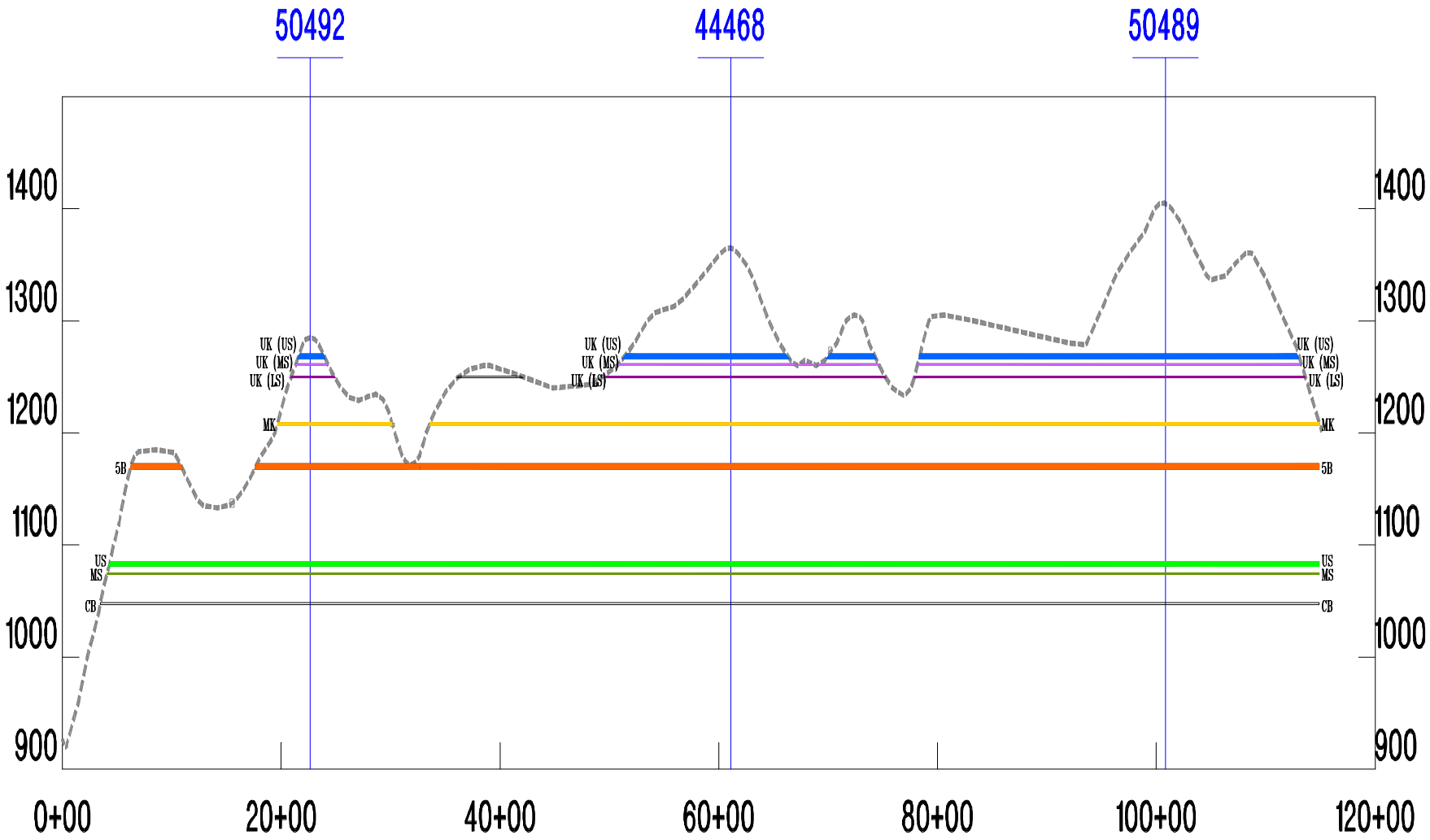
SEAM CODE	WORK NO	SECT	STR-ATI-GRAP	SRN REA CLT	ROOF DEPTH ft	FLOOR DEPTH ft	APPARENT THICKNESS ft	DESCRIPTION	ANALYTICAL
				LRW	0.000	20.000	20.000	CASING.	
				LRW	20.000	30.000	10.000	SANDSTONE. <CHIPPED>	
				LRW	30.000	48.890	18.890	SANDSTONE, BROWN GREY, FINE GRAIN SIZE, MEDIUM GRAIN SIZE, MASSIVE, SHARP BASE, MEDIUM HARD.	
				LRW	48.890	53.490	4.600	SHALE: SANDY, GREY, LAMINATED, DISTINCT BASE, MEDIUM HARD.	
				LRW	53.490	70.500	17.010	SANDSTONE: SHALEY, LIGHT GREY, FINE GRAIN SIZE, SHARP BASE, HARD.	
US1R				LRD	70.530	70.760	0.260	COAL, DISTINCT BASE, MEDIUM HARD.	
				LRW	70.760	70.810	0.050	CARBONACEOUS SHALE: COALY, BLACK, SHARP BASE, MEDIUM HARD.	
				LRW	70.810	71.300	0.490	CLAYSTONE, LIGHT GREY, ROOT STRUCTURES, DISTINCT BASE, MEDIUM HARD.	
				LRW	71.300	71.920	0.620	SHALE: SANDY, GREY, DISTINCT BASE, MEDIUM HARD.	
				LRW	71.920	72.320	0.400	CARBONACEOUS SHALE, BLACK, DISTINCT BASE, MEDIUM HARD.	
				LRD	72.320	72.430	0.110	SHALY COAL, DISTINCT BASE, MEDIUM HARD.	
				LRW	72.430	73.600	1.170	FIRECLAY, GREY, DISTINCT BASE, MEDIUM SOFT.	
LST1				LRD	73.600	73.830	0.230	COAL - DULL, DISTINCT BASE, MEDIUM HARD.	
LST1				LRW	73.830	74.000	0.170	CARBONACEOUS SHALE, BLACK, DISTINCT BASE, MEDIUM HARD.	
LST1				LRD	74.000	74.400	0.400	COAL, DISTINCT BASE, MEDIUM HARD.	
LST1				LRD	74.400	74.910	0.510	COAL - BONEY, DISTINCT BASE, MEDIUM HARD.	
UST1				LRD	74.910	75.200	0.290	COAL, DISTINCT BASE, MEDIUM HARD.	
UST1				LRD	75.200	75.610	0.410	COAL - BONEY, DISTINCT BASE, MEDIUM HARD.	
UST1				LRD	75.610	75.680	0.070	BONE, DISTINCT BASE, MEDIUM HARD.	
UST1				LRD	75.680	75.770	0.090	COAL, DISTINCT BASE, MEDIUM HARD.	
UST1				LRD	75.770	75.860	0.090	BONE, DISTINCT BASE, MEDIUM HARD.	
UST1				LRD	75.860	76.010	0.150	COAL - BONEY, DISTINCT BASE, MEDIUM HARD.	
UST1				LRD	76.010	76.190	0.180	BONE, DISTINCT BASE, MEDIUM HARD.	
UST1				LRD	76.190	76.420	0.230	COAL - BONEY, DISTINCT BASE, MEDIUM HARD.	
				LRD	76.420	77.200	0.780	CARBONACEOUS SHALE, BLACK, DISTINCT BASE, MEDIUM HARD.	
				LRD	77.200	77.400	0.200	SHALY COAL: BONEY, SHARP BASE, MEDIUM HARD.	
				LRW	77.400	161.940	84.540	SANDSTONE: SHALEY, GREY, FINE GRAIN SIZE, MEDIUM GRAIN SIZE, CROSS BEDDED, MASSIVE, SHARP BASE, MEDIUM HARD.	
				LRW	161.940	170.840	8.900	SHALE: SANDY, GREY, SIDERITIC, LAMINATED, SHARP BASE, MEDIUM HARD.	
				LRW	170.840	171.690	0.850	CARBONACEOUS SHALE, BLACK, MASSIVE, SHARP BASE, MEDIUM HARD.	
				LRW	171.690	172.590	0.900	SHALE, GREY, DISTINCT BASE, MEDIUM HARD.	
				LRW	172.590	173.490	0.900	CARBONACEOUS SHALE, BLACK, MASSIVE, DISTINCT BASE, MEDIUM HARD.	
				LRW	173.490	174.360	0.870	CLAYSTONE, GREY, DISTINCT BASE, MEDIUM HARD.	
				LRW	174.360	174.430	0.070	CARBONACEOUS SHALE, BLACK, DISTINCT BASE, MEDIUM HARD.	
.ST				LRD	174.430	174.910	0.480	COAL - BONEY, DISTINCT BASE, MEDIUM HARD.	
.ST				LRD	174.910	175.160	0.250	SHALY COAL, DISTINCT BASE.	
				LRW	175.160	178.310	3.150	FIRECLAY, GREY, FOSSILIFEROUS, DISTINCT BASE, MEDIUM HARD.	
				LRW	178.310	196.300	17.990	SHALE: SANDY, GREY, SIDERITIC, FOSSILIFEROUS, LAMINATED, DISTINCT BASE, MEDIUM HARD.	
				LRW	196.300	217.200	20.900	SANDSTONE: SHALEY, BROWN GREY, FINE GRAIN SIZE, MEDIUM GRAIN SIZE, MASSIVE, CROSS BEDDED, SHARP BASE, HARD.	
UCB1				LRD	217.200	217.370	0.170	SHALY COAL, DISTINCT BASE, MEDIUM HARD.	
UCB1				LRD	217.370	218.760	1.390	COAL - BONEY, DISTINCT BASE, MEDIUM HARD.	

Geologist Log

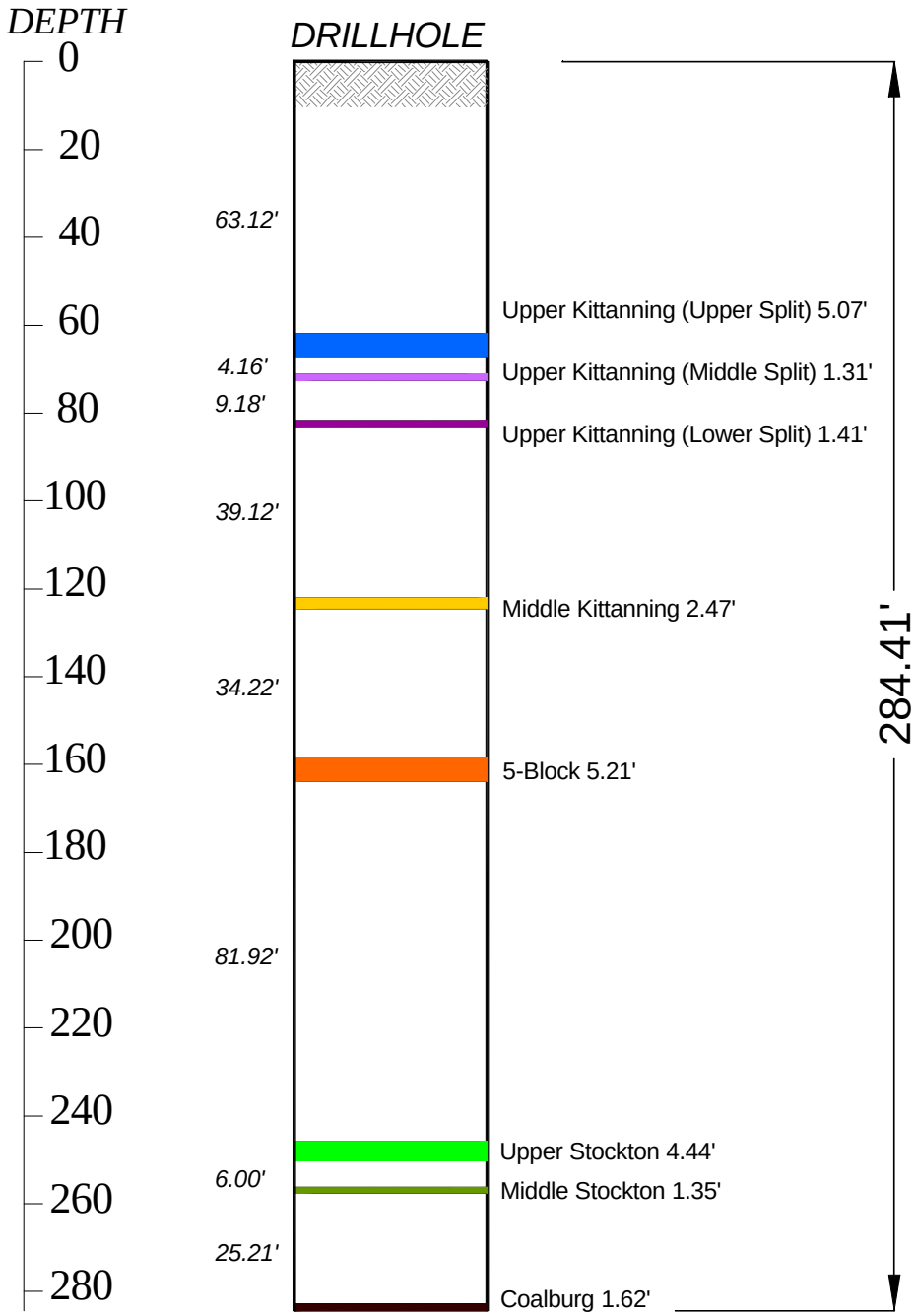


Geophysical (Electric) Log

Stratigraphic Cross-Section



Geologic Column

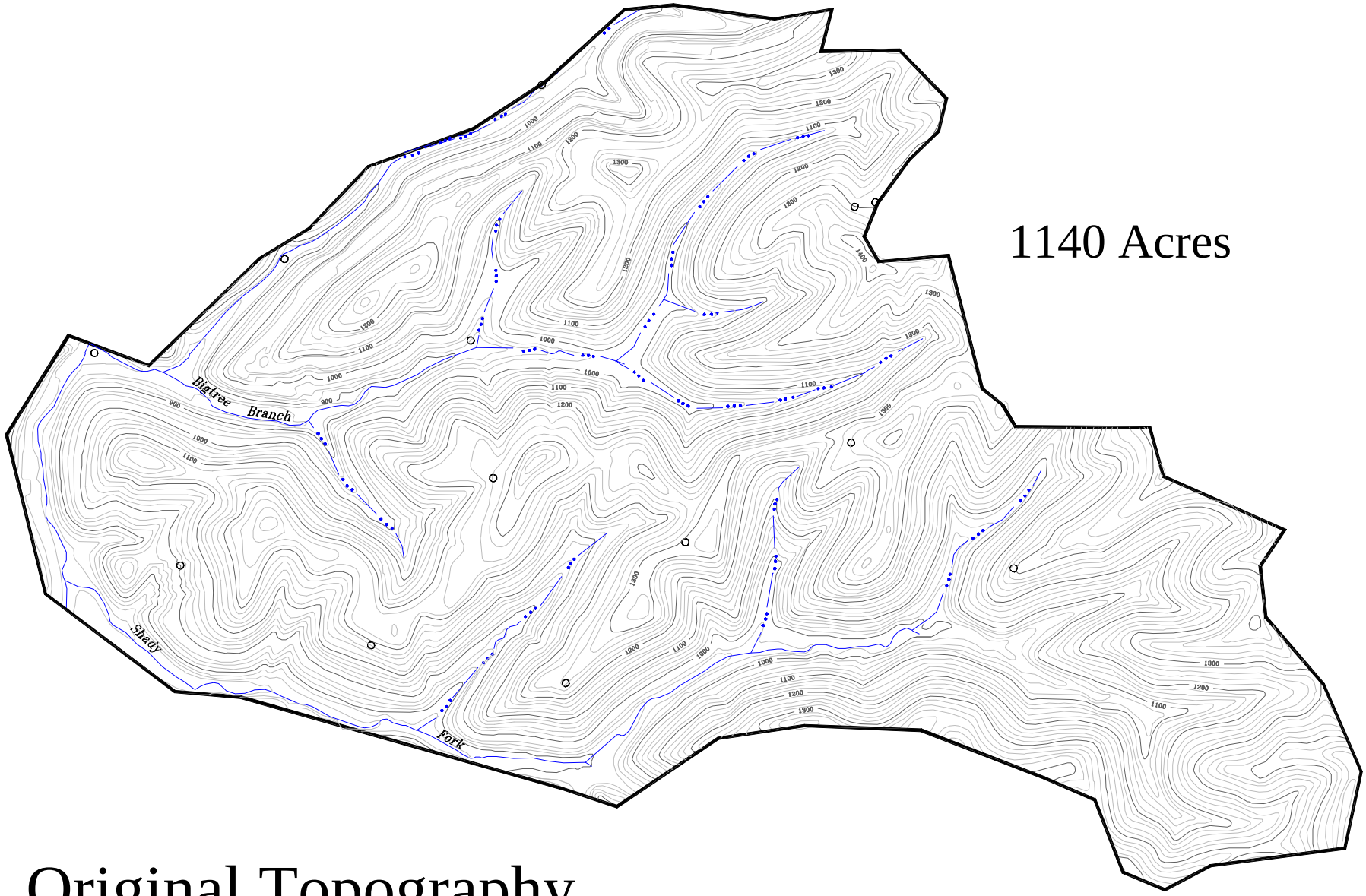


OPERATIONAL

- Location
- Access
- Legal Considerations
  - Mineral Ownership
  - Surface Ownership
  - Oil and Gas Rights
- Infrastructure
  - Coal Preparation Facilities
  - Transportation Facilities

TOPOGRAPHICAL

- Drainage Patterns
- Natural Terrain
  - Slopes
  - General Configuration
- Relative Elevations
  - Coal Seams to Surface
  - Seam to Seam
- Potential Excess Spoil Sites



1140 Acres

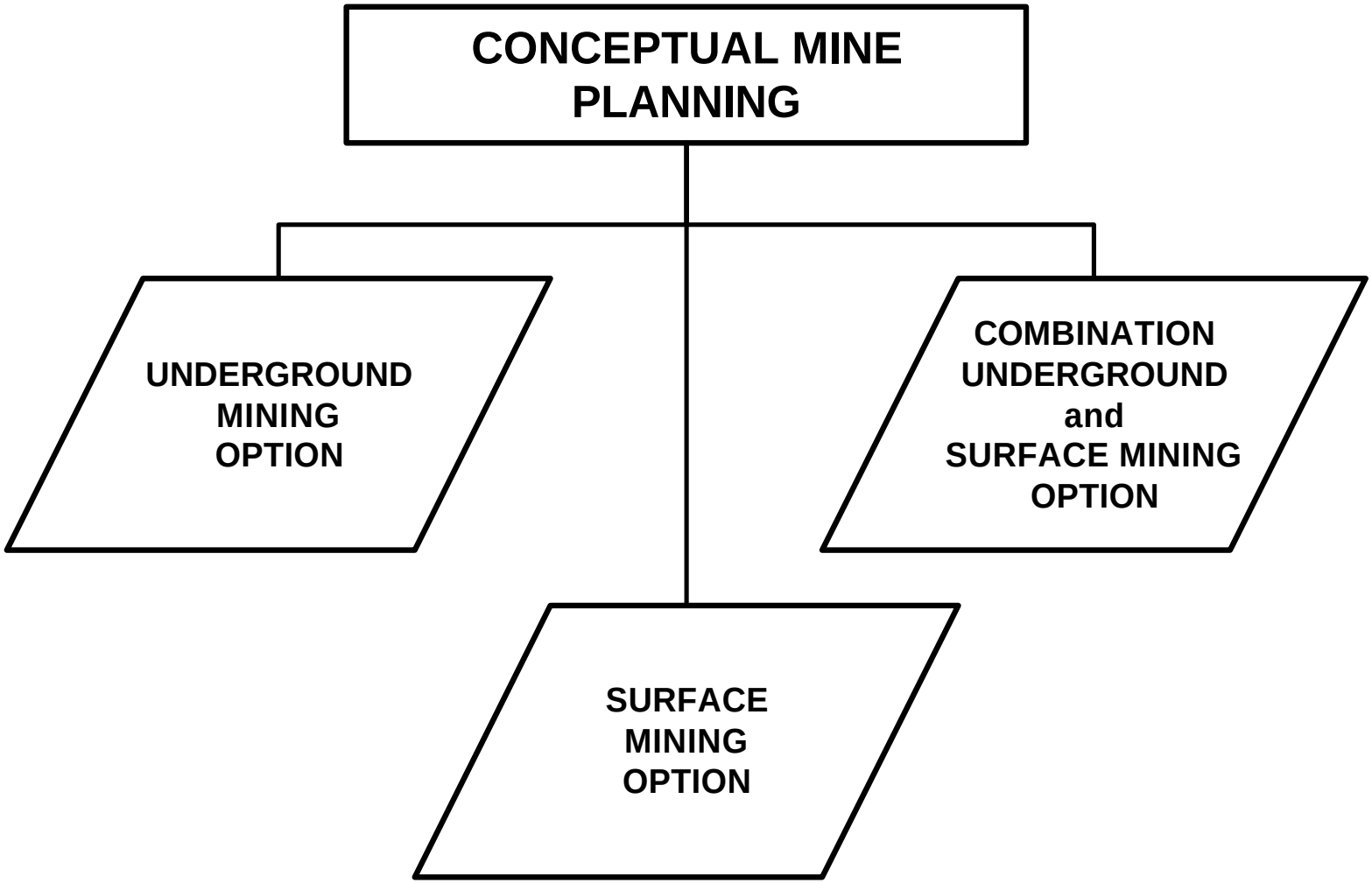
Original Topography

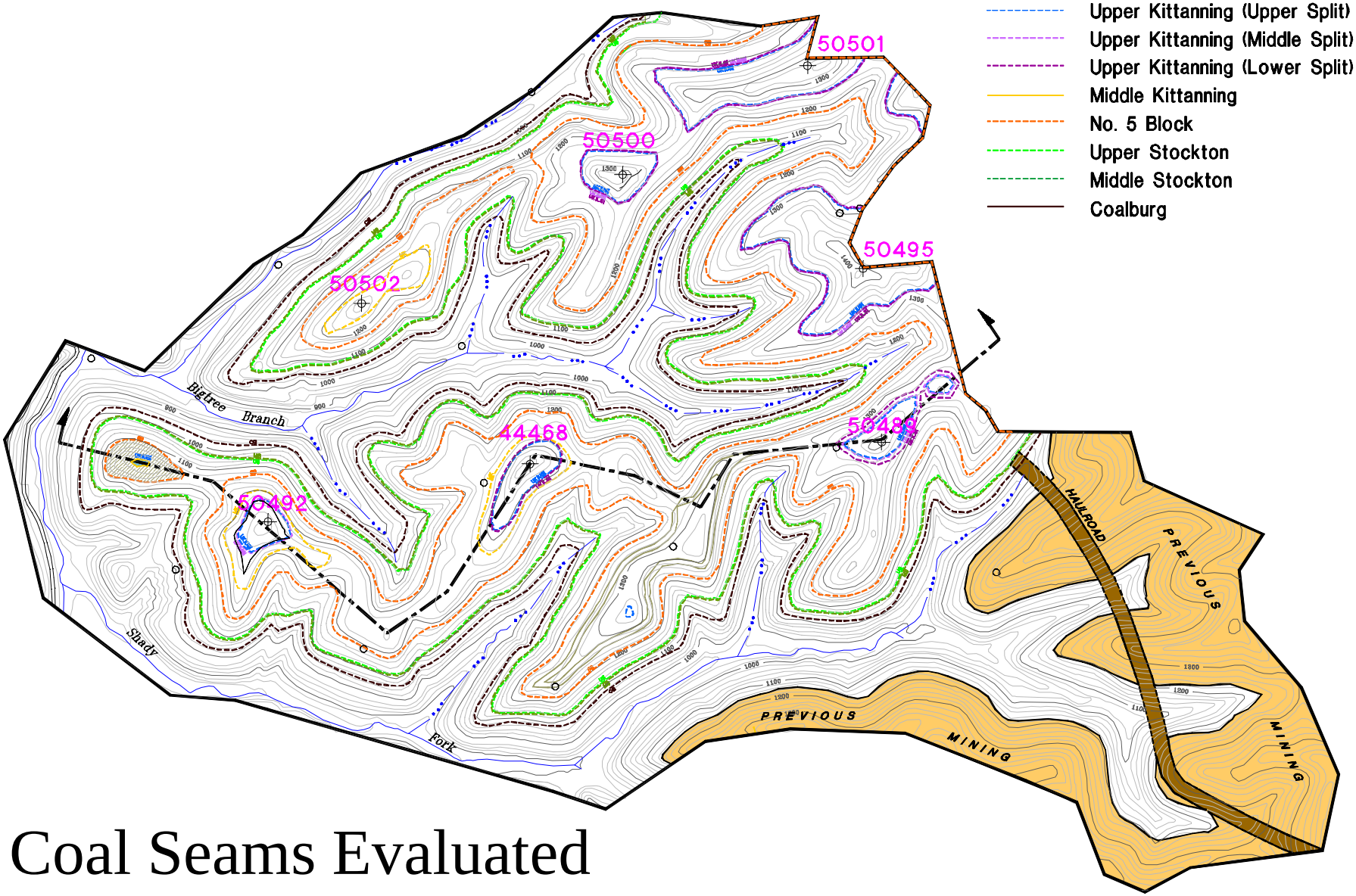
Conceptual Mine Plan

Identification and Evaluation

of

Alternatives


CONCEPTUAL MINE PLANNING
UNDERGROUND MINING OPTION
COMBINATION UNDERGROUND and SURFACE MINING OPTION
SURFACE MINING OPTION



Coal Seams Evaluated
Location of Stratigraphic Cross-Section

Reserve Criteria

Mining Method Analysis
Assumptions

Deep Mining

A Minimum 30" Mining Height
B Minimum 100 feet of Cover
C Leave 100 foot outcrop barrier
D Reserve size of at least 500,000 clean, recoverable tons
E Mining Recovery of 60%
F Must have at least 40 feet of interval to subjacent or superadjacent deep mining
G Yield must be greater than 50%
H Minimum 3" Out of Seam Dilution added during mining
I Must leave 200 ft. barrier to old works
J Must leave 100 ft. radius barrier around gas wells

Contour Mining

A Must have at least 20 feet of cover
B Seam must be at least 12" thick to be recovered
C 85% pit recovery
D Bench width must be at least 80 feet.
E Split must be at least 6" to be loaded

Mountaintop Mining

A Must have at least 20 feet of cover
B Seam must be at least 12" thick or 6" if a split of another seam to be recovered
C 85% pit recovery

Miscellaneous

A Washed Quality based on 1.60 float gravity
B Plant efficiency is 92%
C Ash must be less than 16% (Dry Basis) to be direct shipped
D BTU must be at least 12,800 (Dry Basis) to be direct shipped

UNDERGROUND MINING

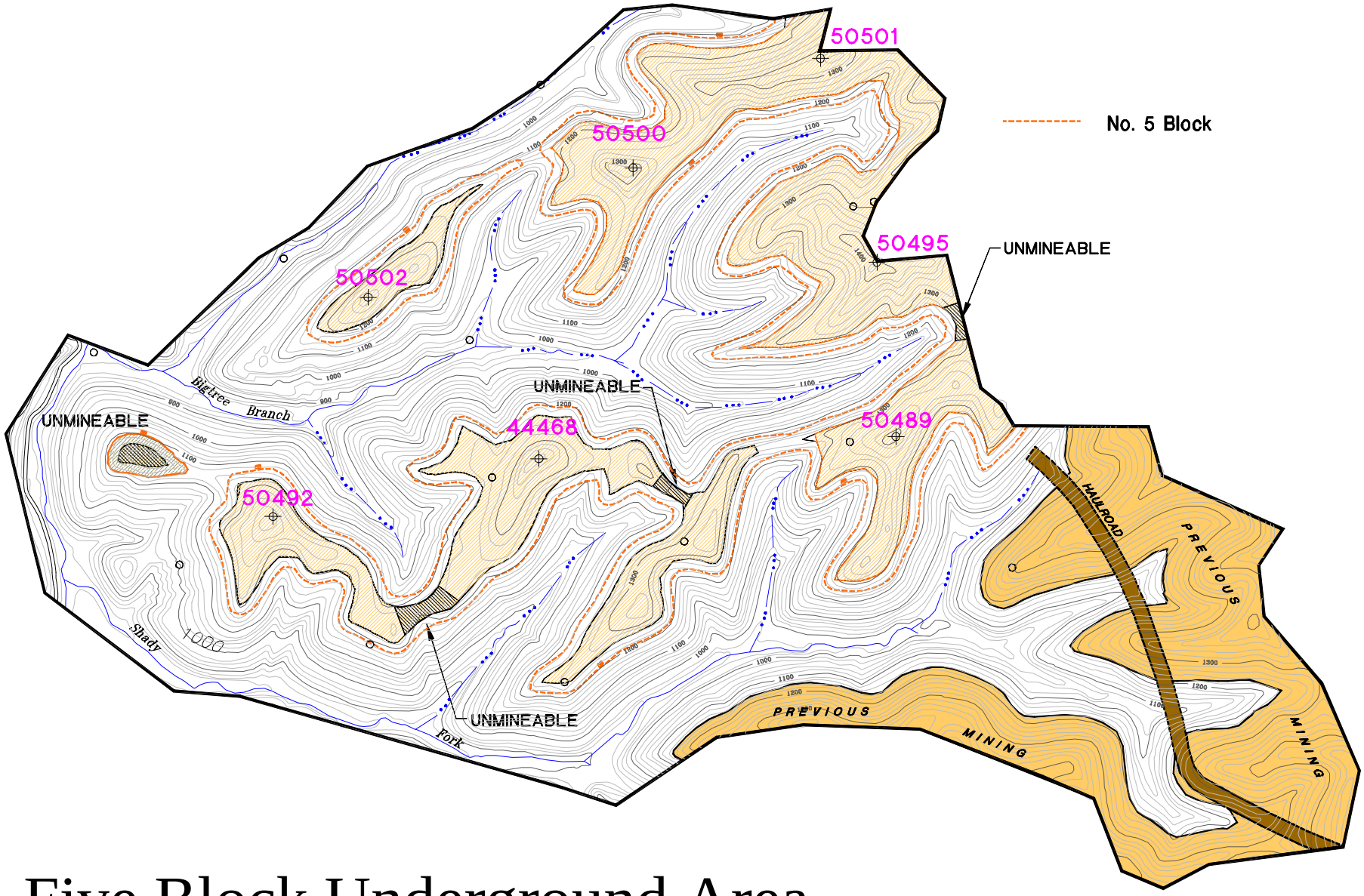
- **Identify Minable Seams Based on Available Reserve and Projected Mining Conditions**
  - **Seam Extent and Thickness**
  - **Roof and Floor Conditions**
  - **Expected Recovery**
- **Identify Potential Mine Portal Sites**
- **Estimate Coal Extraction Rate**
- **Predict Coal Quality (Markets and Price)**
- **Define Other Constraints / Assumptions**

Underground Mining Percent Recovery

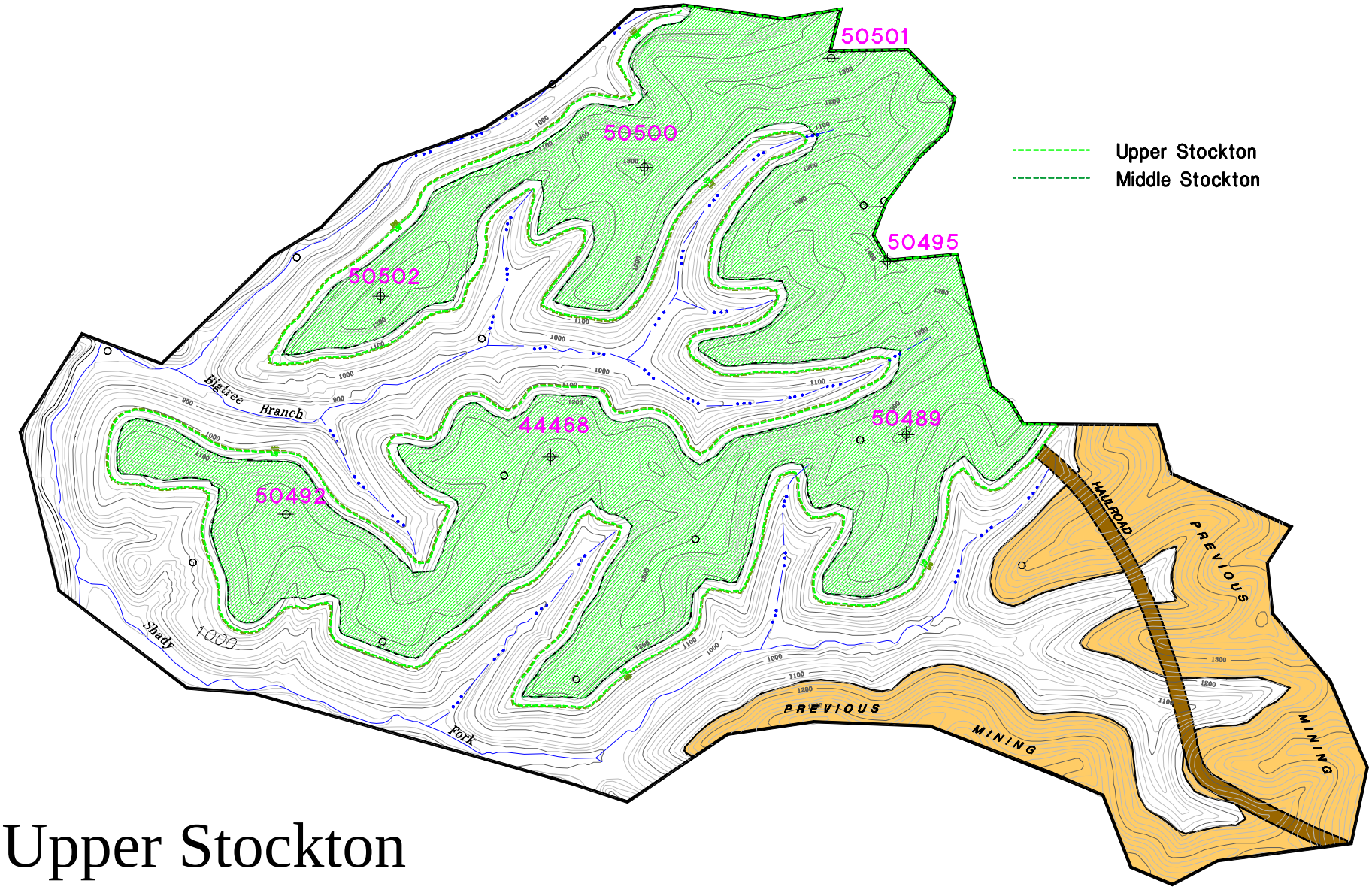
- Underground
  - Room and Pillar
    - 54-60%
  - Second Mining
    - 70-80%
  - Longwall
    - 85%

AMD Prediction: Underground or Auger Mining

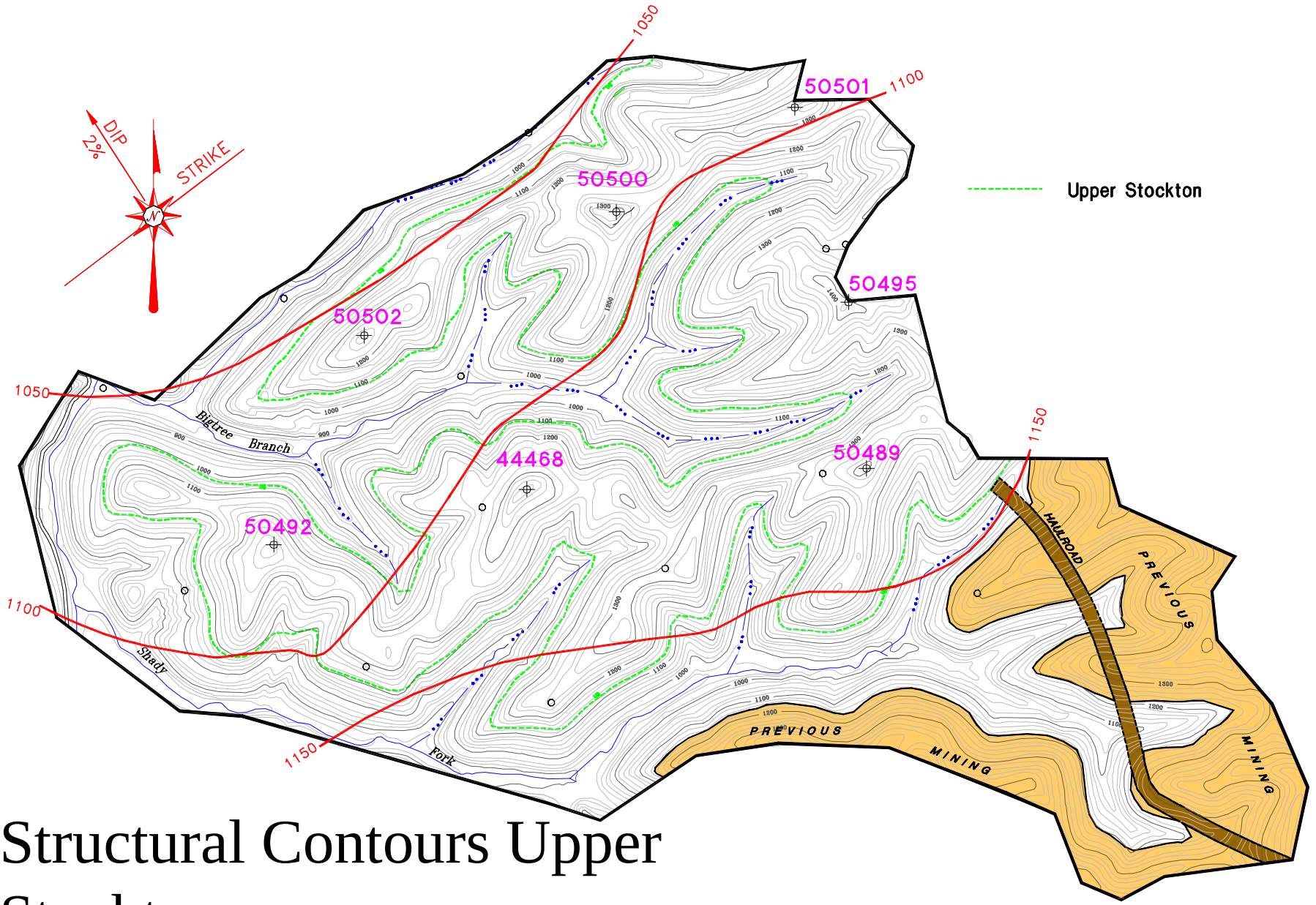
- AMD Potential Indicated? - No
  - Develop Total Reserve Body
- AMD Potential Indicated? -Yes
  - Is Seam Accessible to Eliminate Potential AMD?
  - Define Extent of Reserve Body Minable
- Calculate Run of Mine Recoverable Reserves
- Calculate Clean Recoverable Tons



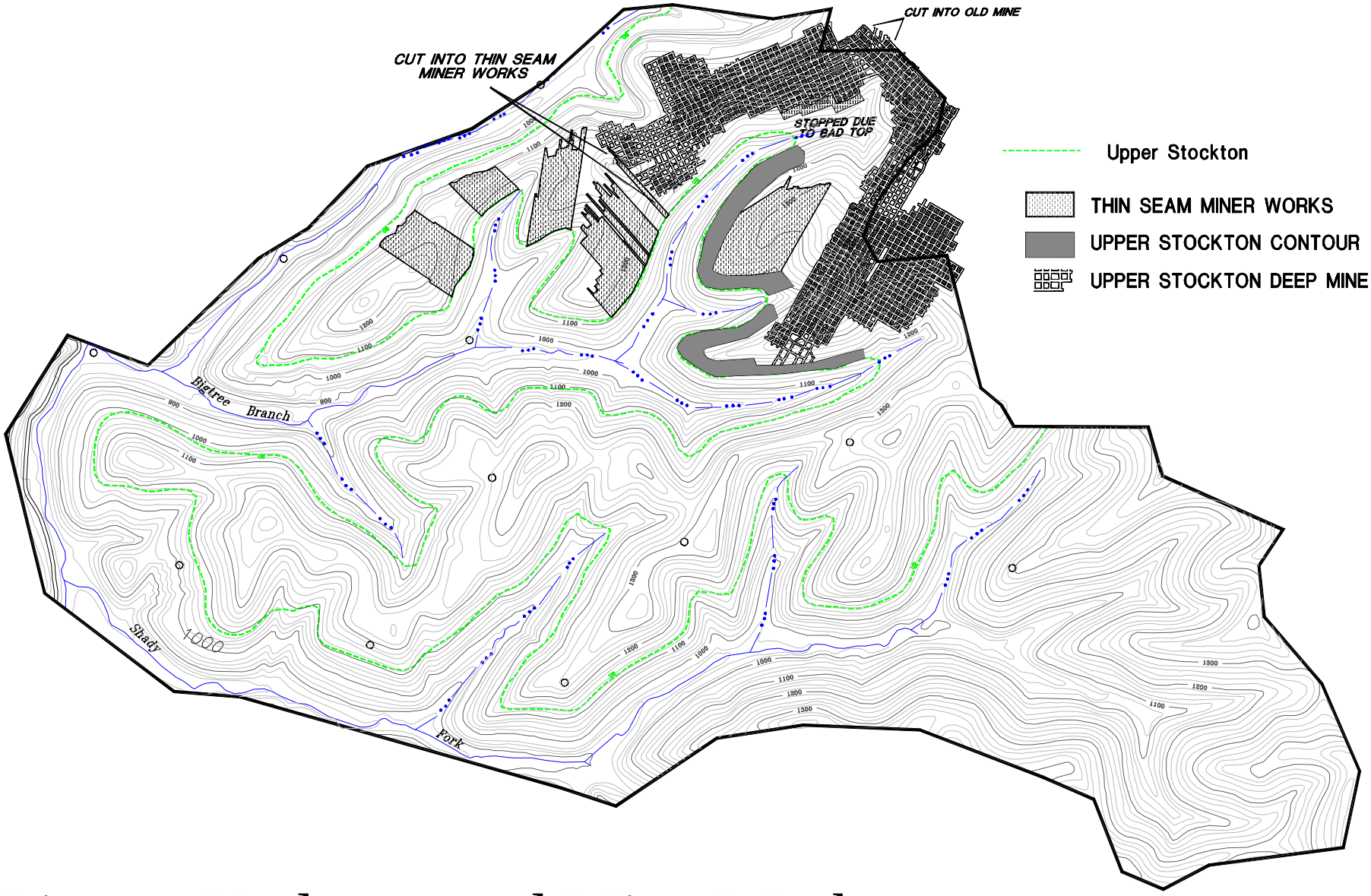
Five Block Underground Area



Upper Stockton Underground Mine



Structural Contours Upper Stockton



Bigtree Underground Mine Works


13 R
60 C
7 R
NO 6

SURFACE MINING

- Identify Minable Seams Based on Thickness and Incremental Ratios
- Tentatively Assign Mining Method to Each Seam (Mountaintop, Contour, Area)
- Predict Coal Quality Per Seam or Seam Split (Markets and Price)
- Identify Strata Requiring Special Handling
- Identify Excess Spoil Disposal Sites
- Define Other Constraints / Assumptions

Surface Mine Methods
Percent Recovery Within Pit

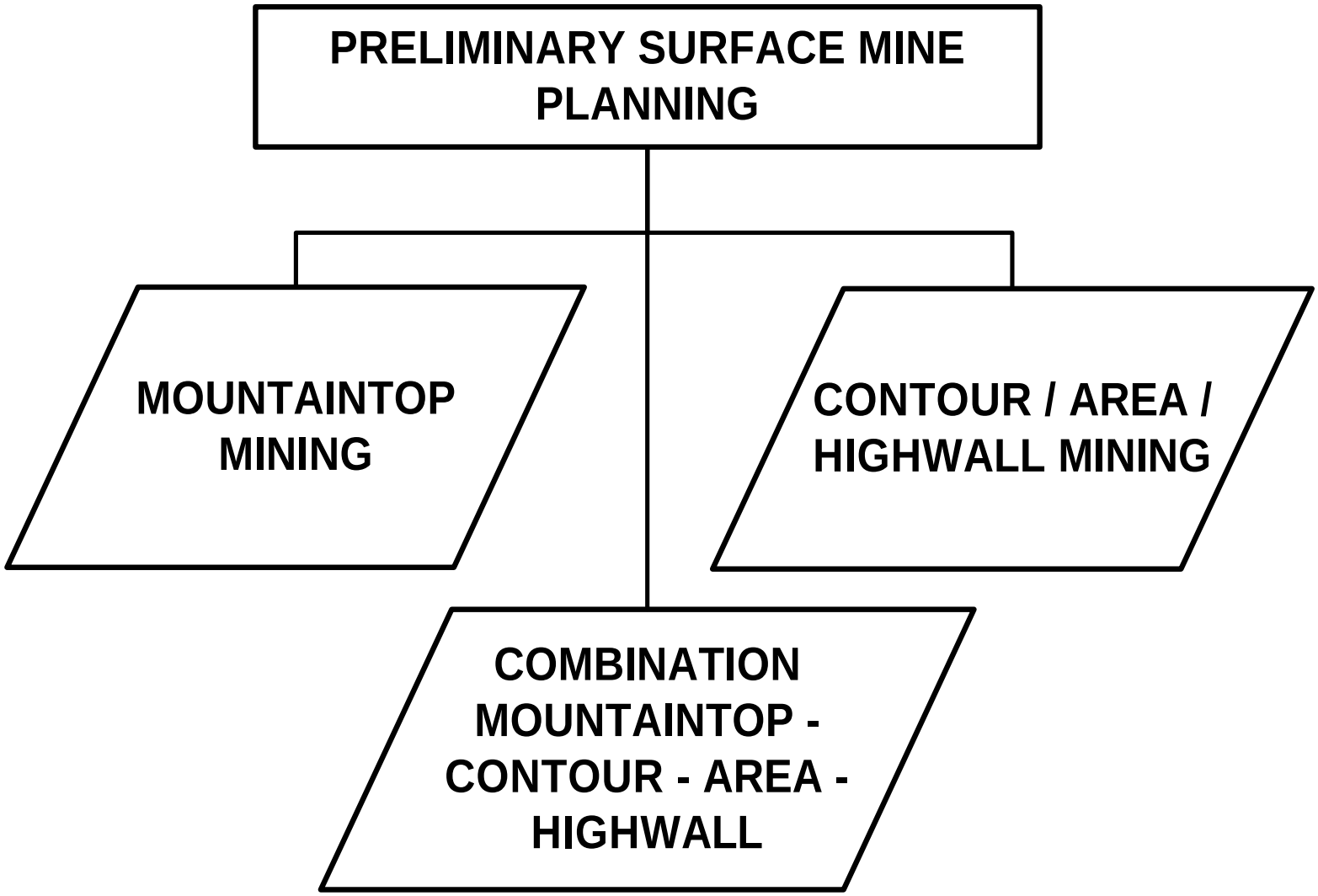
- Surface
  - Mountaintop
    - 85%
  - Contour
    - 85%
  - Auger
    - 30 %
  - Highwall Miner
    - 35-45%

Combination Underground and Surface Mining

- Identify Seams to be Surface Mined
- Identify Seams to be Deep Mined
- Locate Excess Spoil Disposal Sites
- Locate Underground Mine Facilities to Avoid Conflicts with Surface Mining
- Define Other Constraints / Assumptions

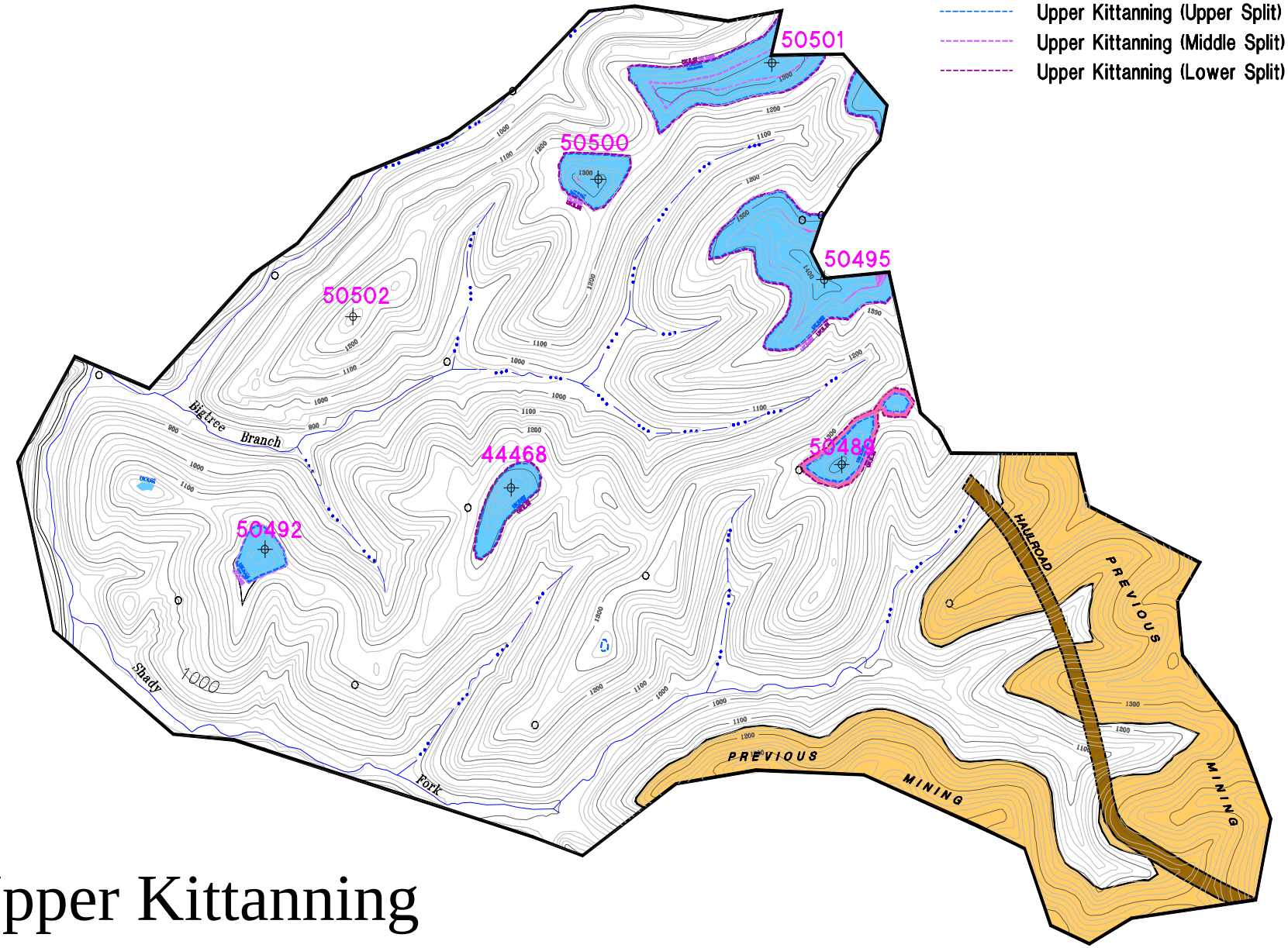
Preliminary Surface Mine Plan

NOTE: Presumes That Other Alternatives Have Been Considered and Discarded

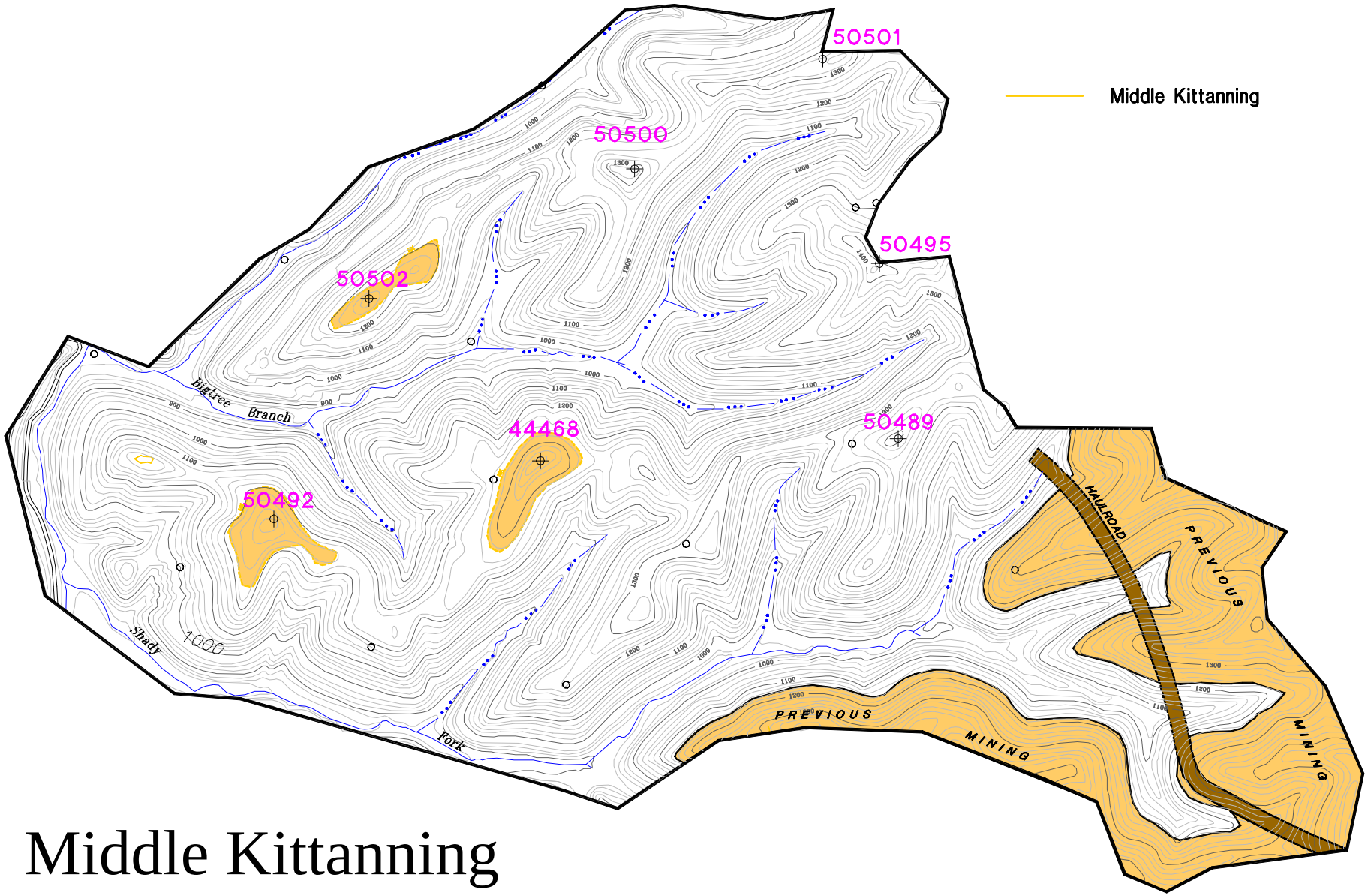

PRELIMINARY SURFACE MINE PLANNING
MOUNTAINTOP MINING
CONTOUR / AREA / HIGHWALL MINING
COMBINATION MOUNTAINTOP - CONTOUR - AREA - HIGHWALL

MOUNTAINTOP MINING

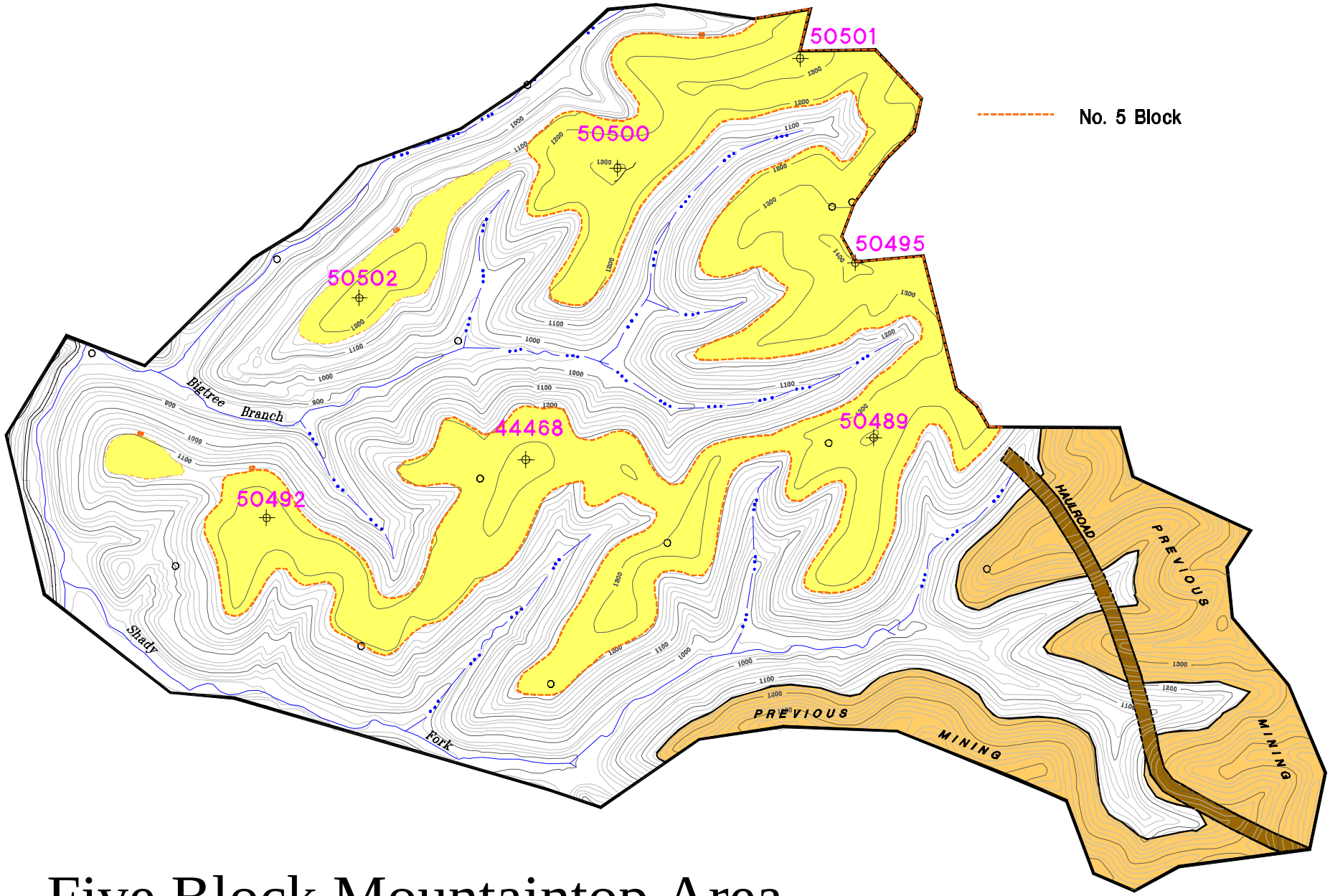
- Define Economic Extent of Potential Mining
- Estimate Coal Recovery as Tonnage and Quality Per Specific Seam
- Construct Preliminary Layout
  - General Mine Sequence
  - Preliminary Regraded Configuration
  - Preliminary Spoil Balance
  - Preliminary Drainage Control Plan
- Define Specific Assumptions / Constraints



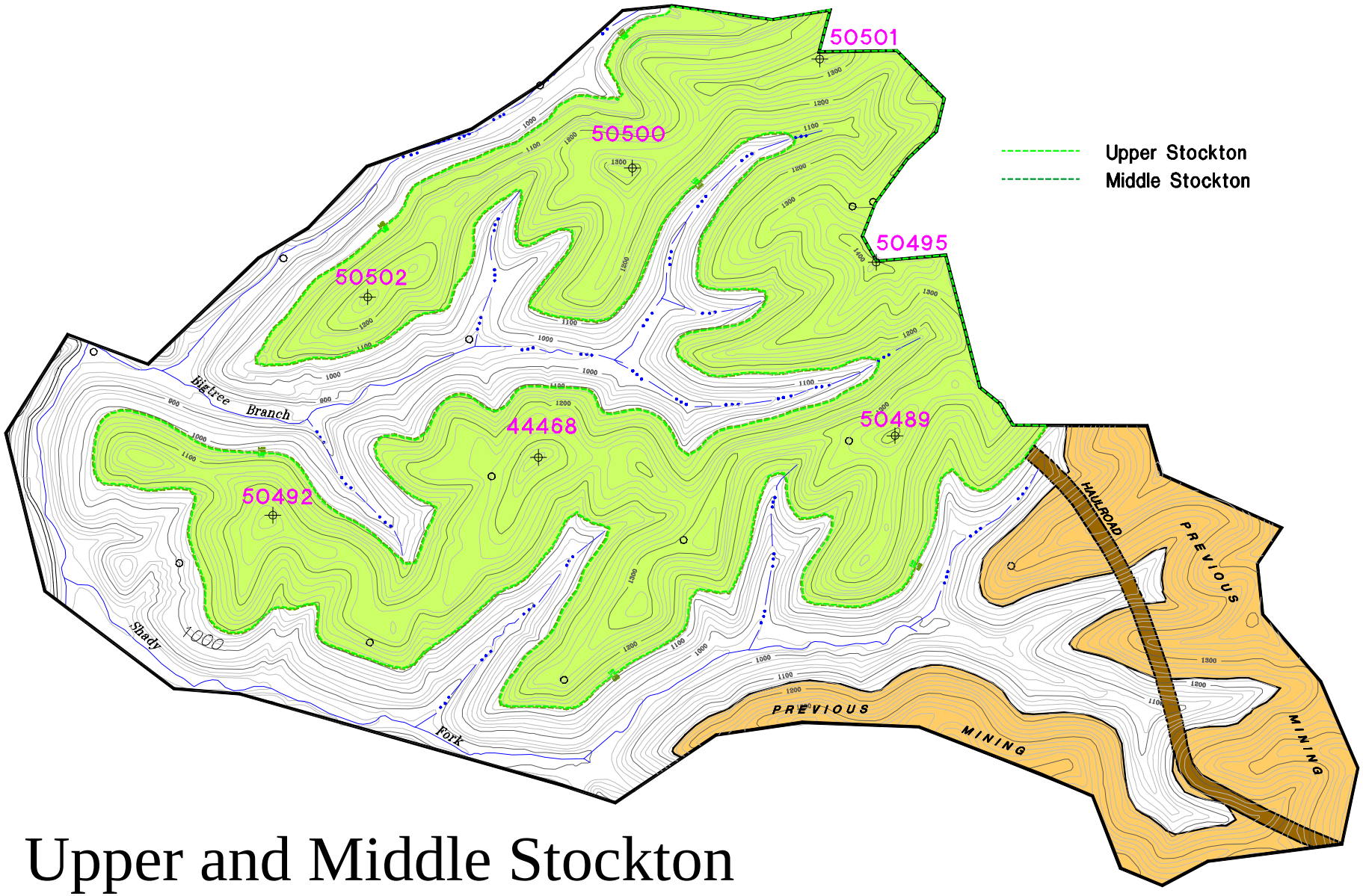
Upper Kittanning Mountaintop Area



Middle Kittanning Mountaintop Area



Five Block Mountaintop Area

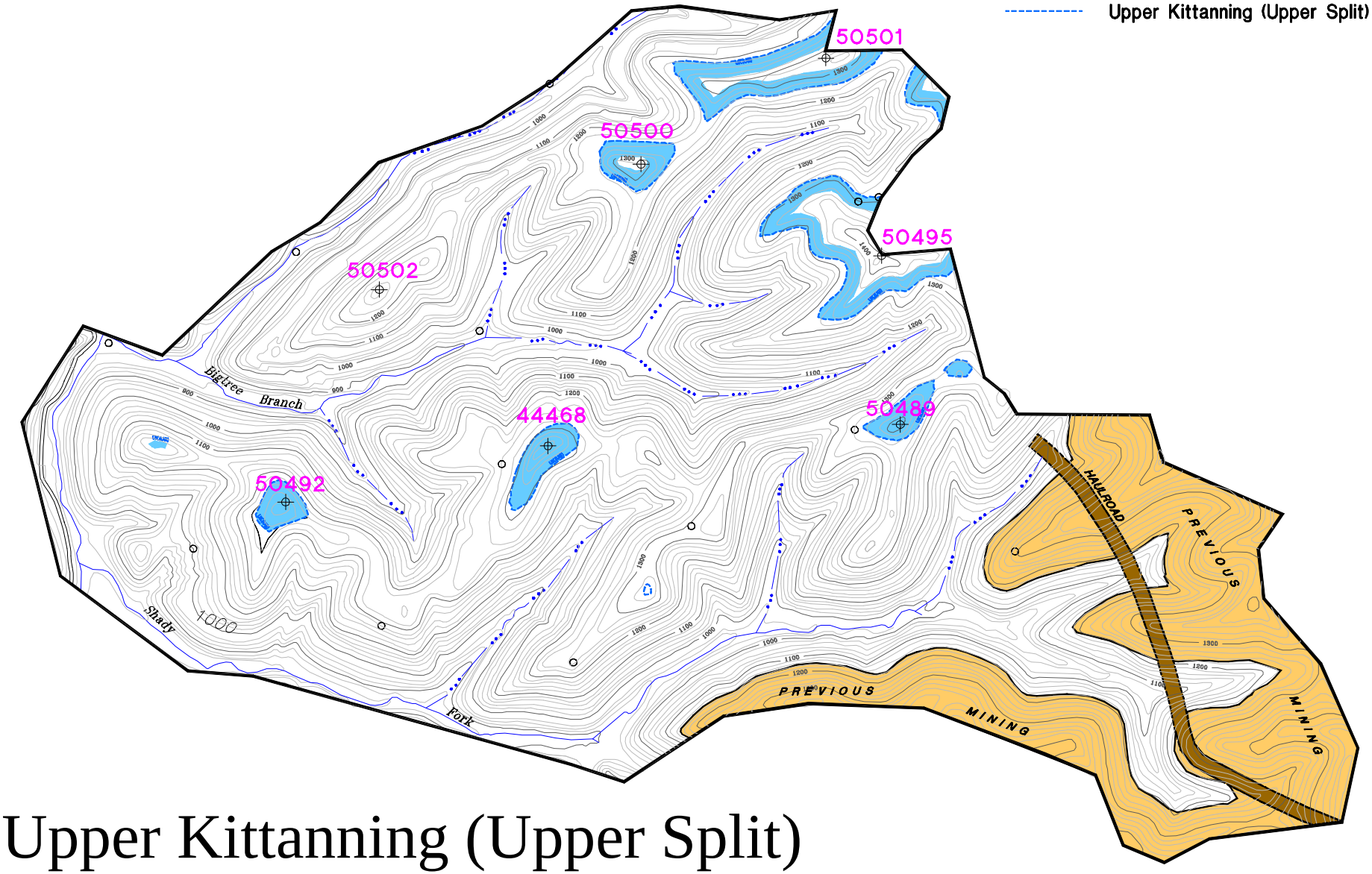


Upper and Middle Stockton Mountaintop Area

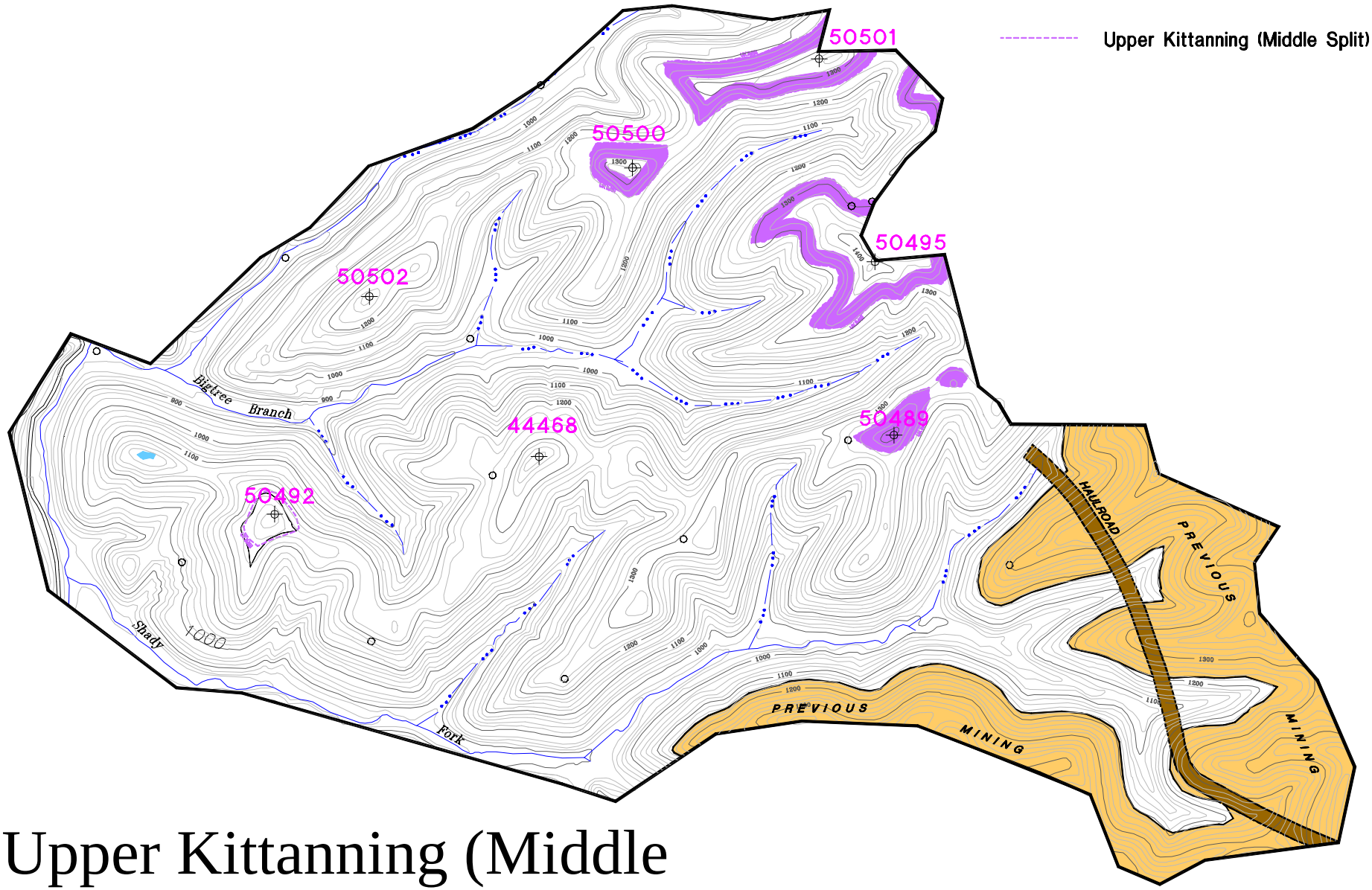
CONTOUR / AREA / HIGHWALL MINING

- Assign Mining Method to Each Seam
- Define Economic Extent of Mining per Seam
- Estimate Coal Recovery as Tonnage and Quality Per Specific Seam
- Construct Preliminary Layout
  - General Mine Sequence
  - Preliminary Regraded Configuration
  - Preliminary Spoil Balance
  - Preliminary Drainage Control Plan
- Define Specific Assumptions / Constraints

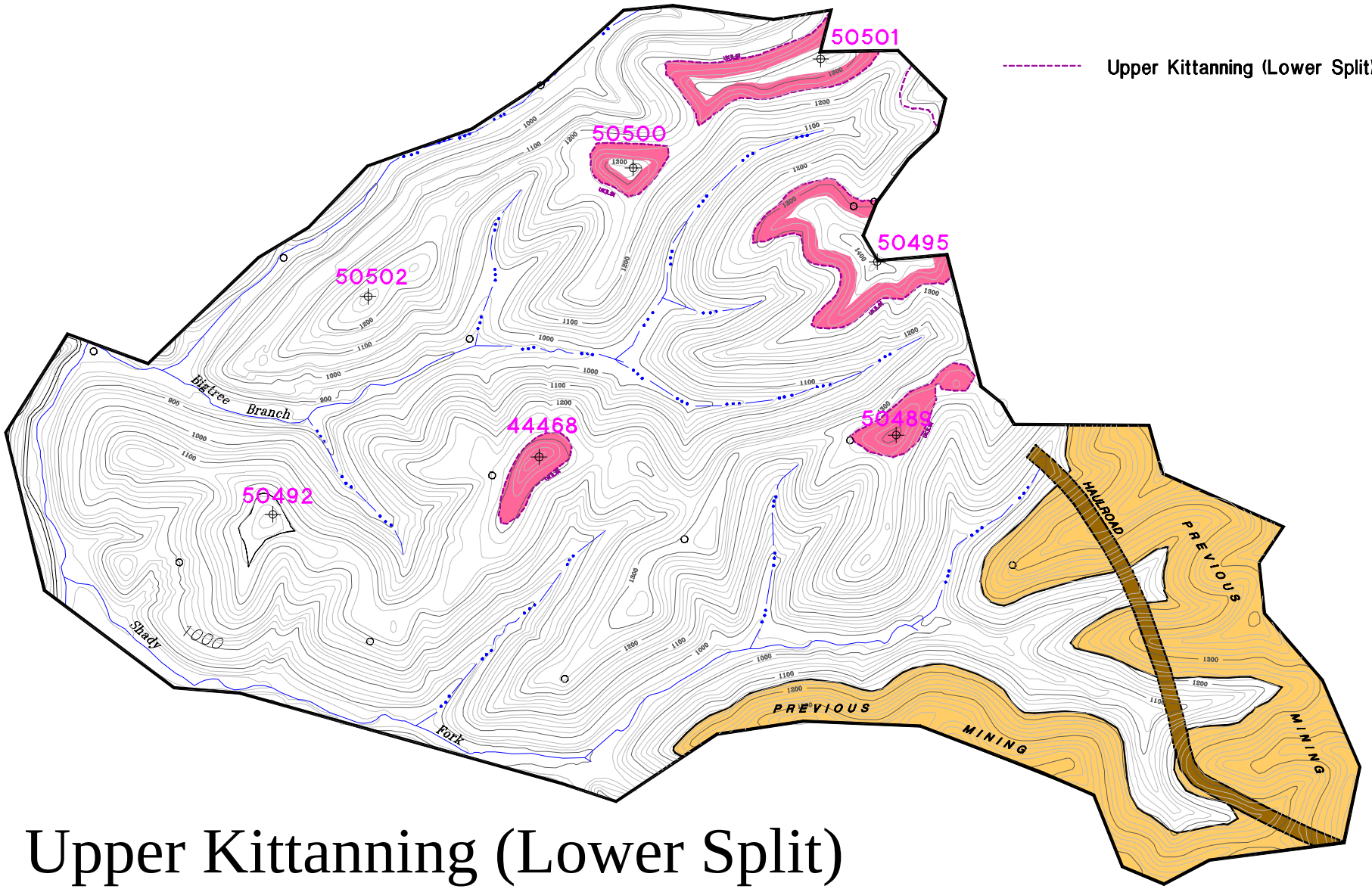
Contour Mining



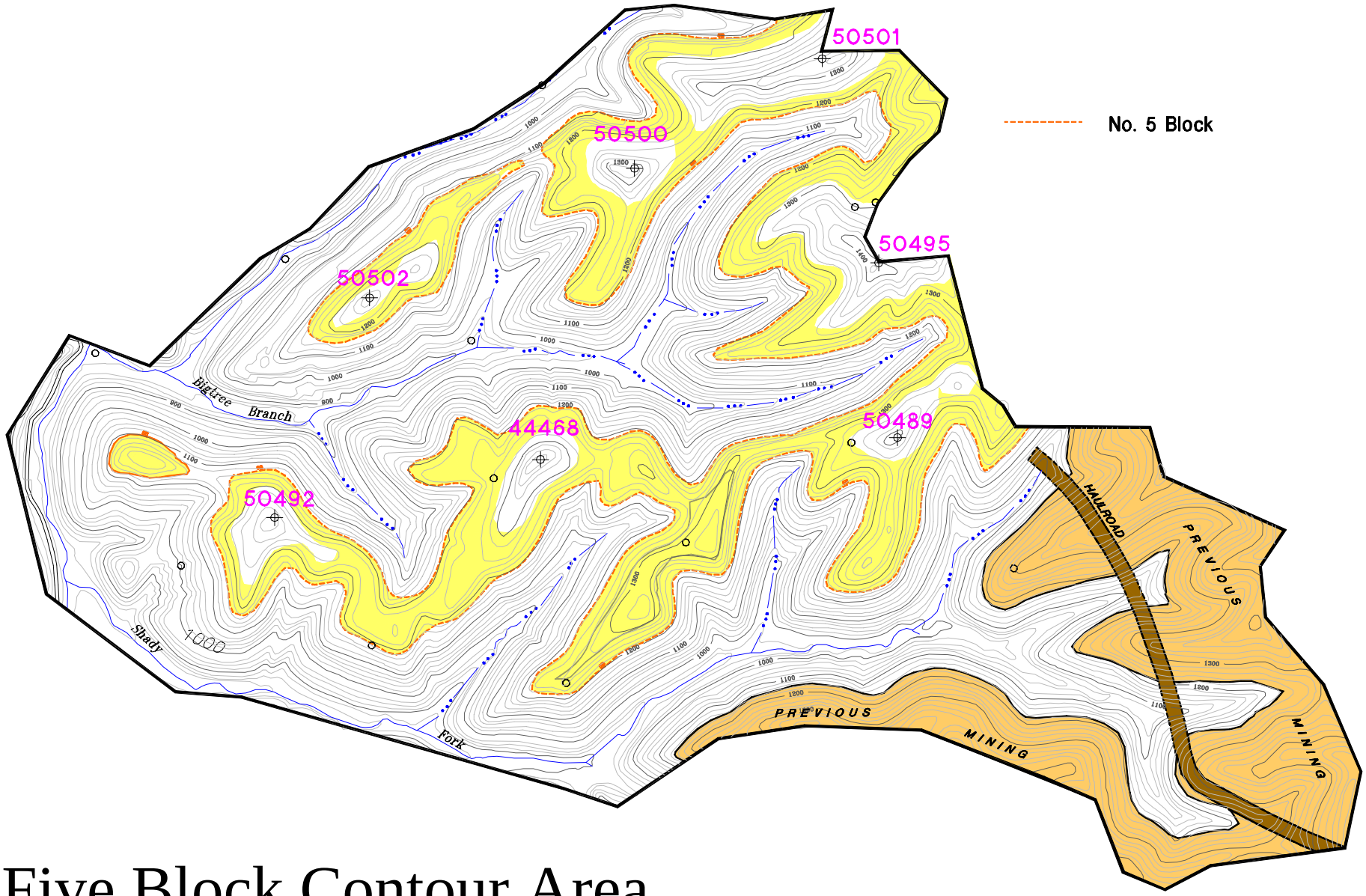
Upper Kittanning (Upper Split) Contour



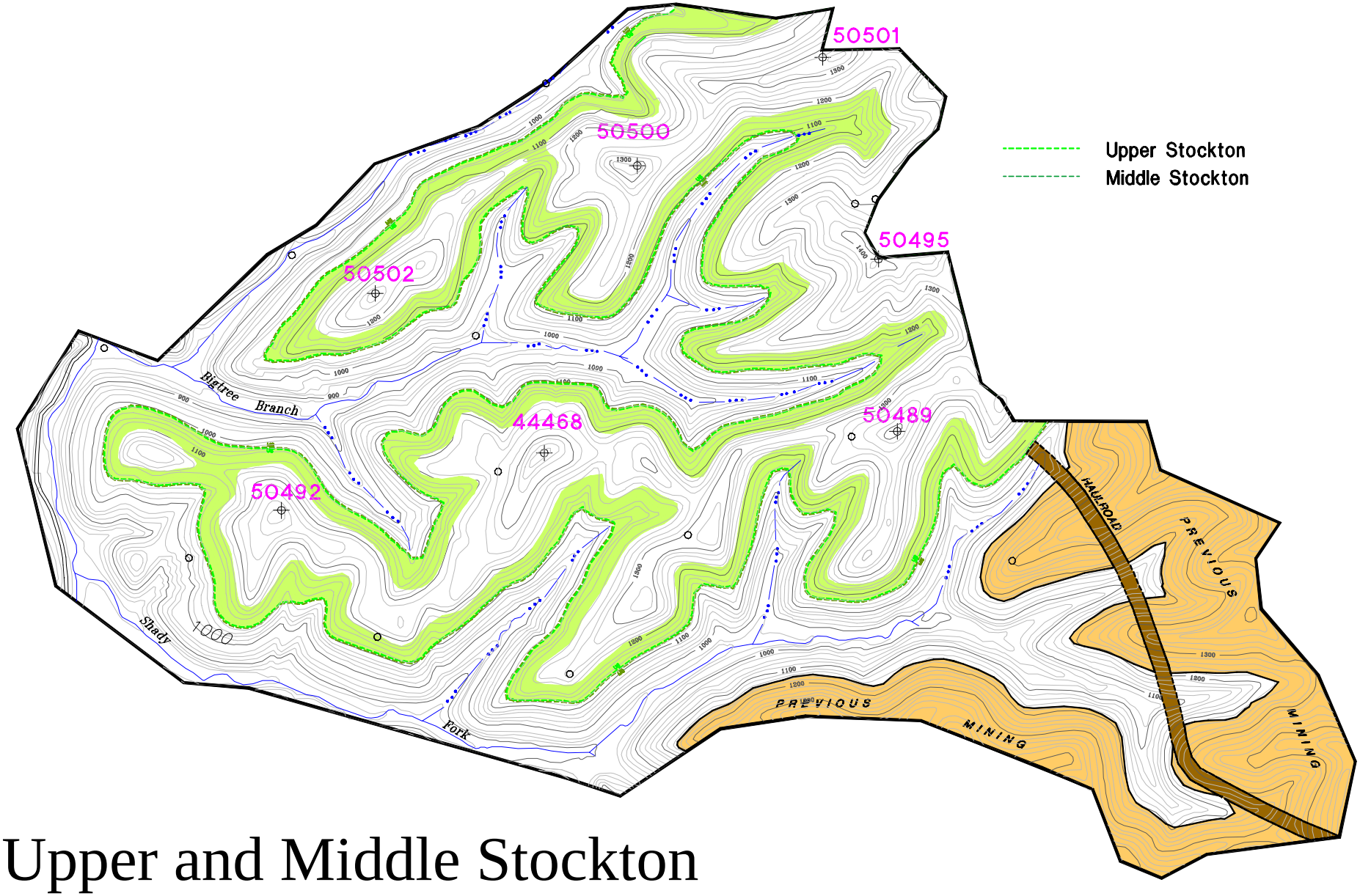
Upper Kittanning (Middle Split) Contour Area



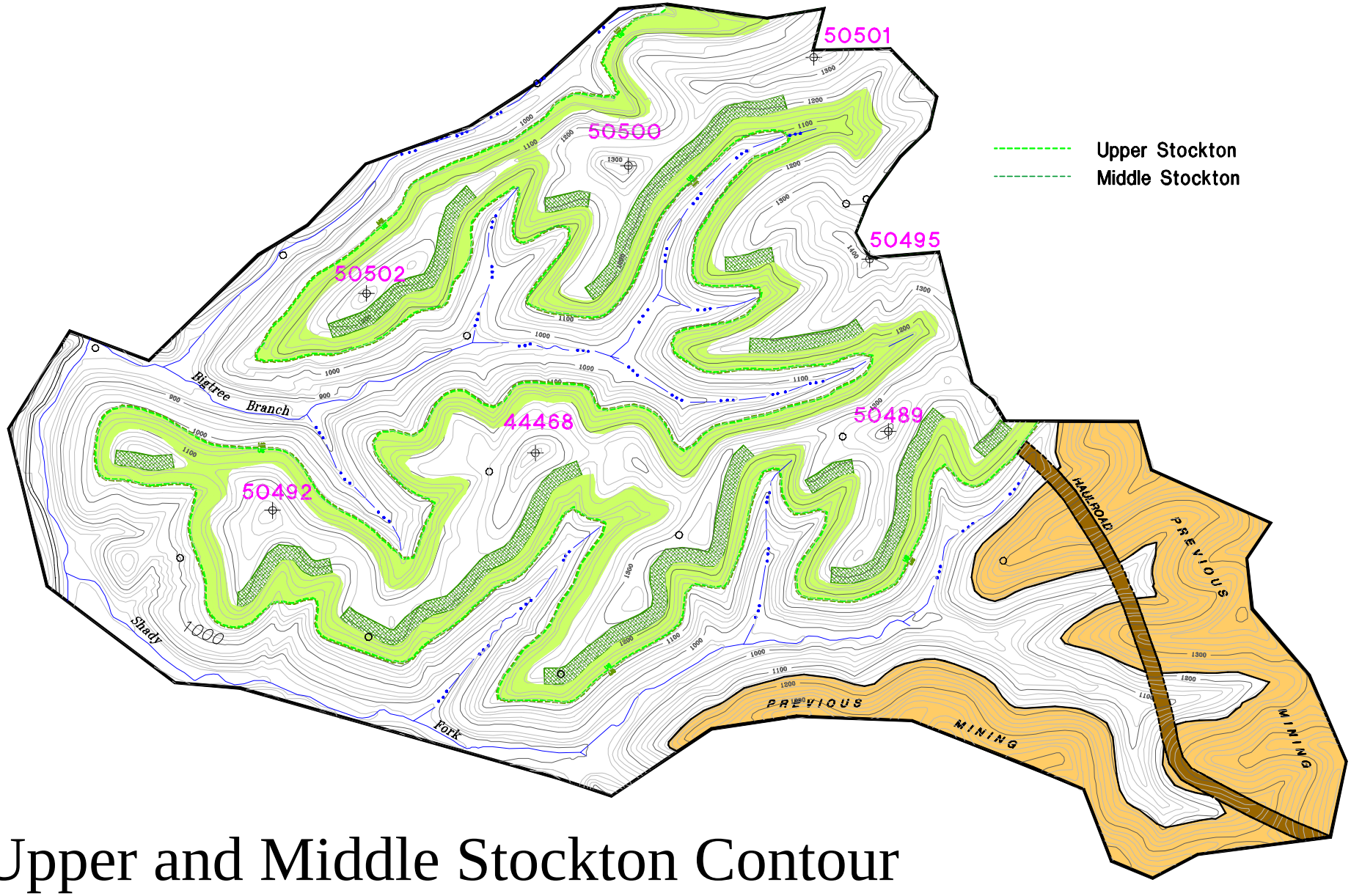
Upper Kittanning (Lower Split) Contour Area



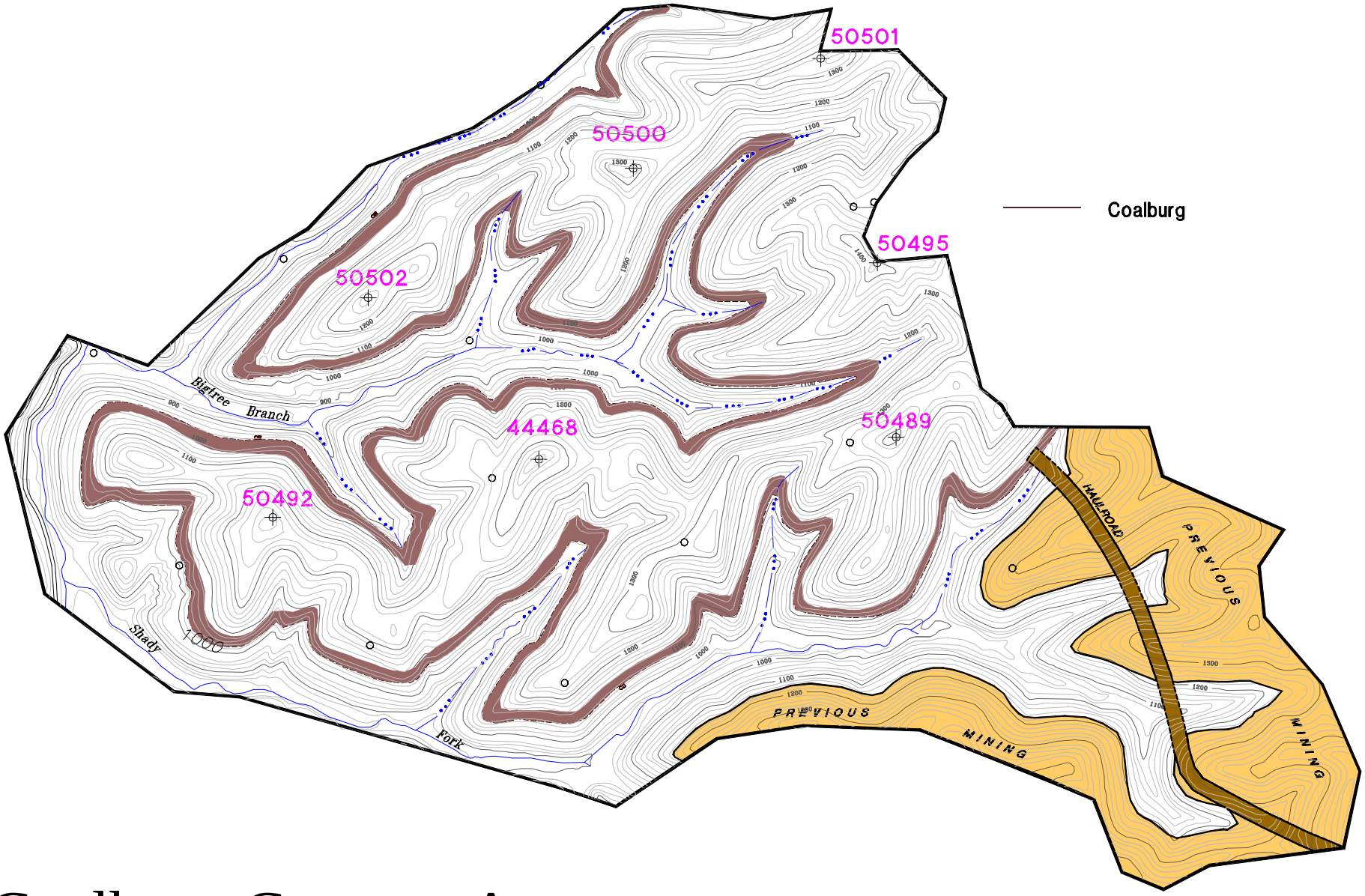
Five Block Contour Area



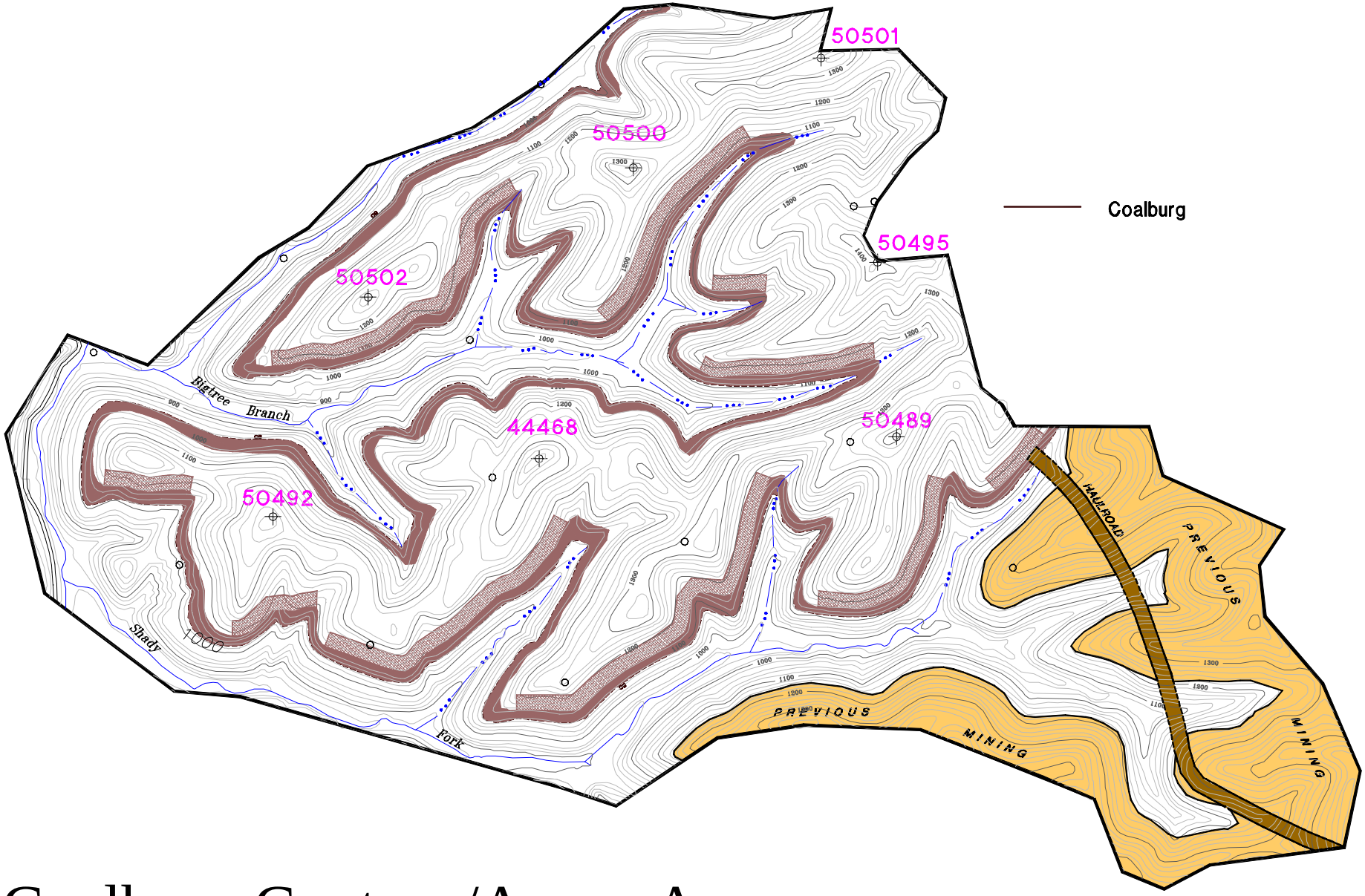
Upper and Middle Stockton Contour Area



Upper and Middle Stockton Contour Area/Upper Stockton Auger Area



Coalburg Contour Area

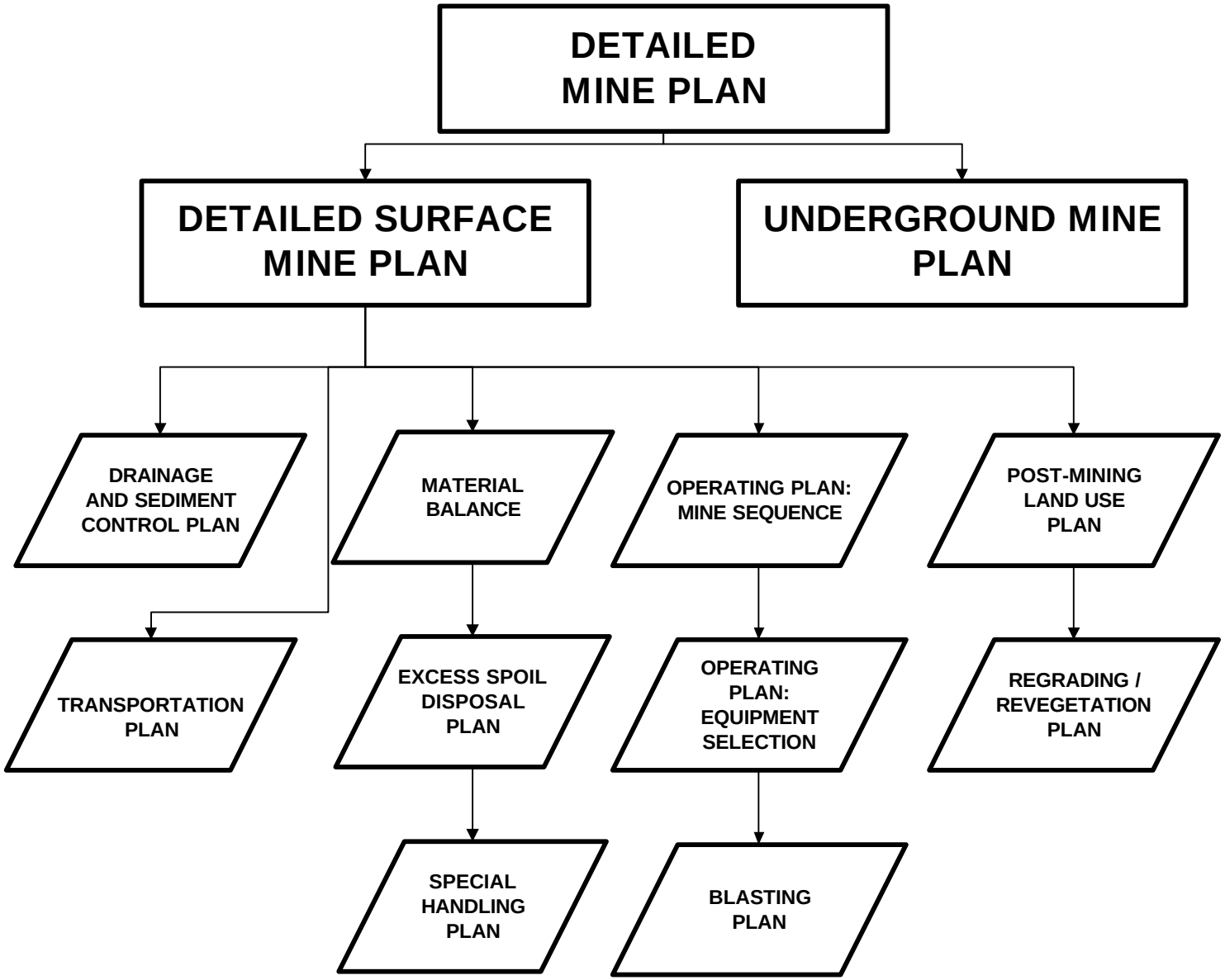


Coalburg Contour/Auger Area

COMBINED MOUNTAINTOP - CONTOUR - AREA - HWM

- Assign Mining Method to Each Seam
- Define Economic Extent of Mining per Seam
- Estimate Coal Recovery as Tonnage and Quality Per Specific Seam
- Construct Preliminary Layout
  - General Mine Sequence
  - Preliminary Regraded Configuration
  - Preliminary Spoil Balance
  - Preliminary Drainage Control Plan
- Define Specific Assumptions / Constraints

Detailed Mine Plan


DETAILED MINE PLAN
DETAILED SURFACE MINE PLAN
UNDERGROUND MINE PLAN
DRAINAGE AND SEDIMENT CONTROL PLAN
MATERIAL BALANCE
OPERATING PLAN: MINE SEQUENCE
POST-MINING LAND USE PLAN
TRANSPORTATION PLAN
EXCESS SPOIL DISPOSAL PLAN
OPERATING PLAN: EQUIPMENT SELECTION
REGRADING / REVEGETATION PLAN
SPECIAL HANDLING PLAN
BLASTING PLAN

Drainage and Sediment Control

- **Locate Primary Sediment Control Structures**
  - **Ponds at Valley Fills**
  - **On-Bench Sediment Structures**
- **Define Temporary Sediment Control Plan**
- **Complete Detailed Drainage Designs**
  - **Sediment Ponds**
  - **Sediment Channels**
  - **Drainage Channels / Flumes**
  - **Culvert Designs (Roads, etc.)**


4 8'96


12 23 '97

Material Balance

- **Calculate Total Material to be Excavated**
- **Determine Volume of Coal to be Recovered**
- **Difference x Swell (typically 25%) Equals Total Spoil Material**
- **Determine Volume of Backfill to Achieve the Post-Mining Configuration**
- **Total Spoil Less Backfill Equals Excess Spoil**
- ***Location of Spoil Disposal Sites Relative to Spoil Generation Sites is Critical to Mine Plan***

Excess Spoil Disposal Plan

- **Define Needs / Constraints / Limitations**
  - **Volume Required Per Site**
  - **Section 404 Considerations**
- **Situate Excess Spoil Disposal Facilities**
  - **On-Bench Where Available and Practical**
  - **Valley Fills**
- **Design Details**
  - **Volume**
  - **Stability**
  - **Drainage (Internal and Surface)**

Location of Valley Fills

Volume Required

Profile of Existing Hollow

Contributing Drainage Area

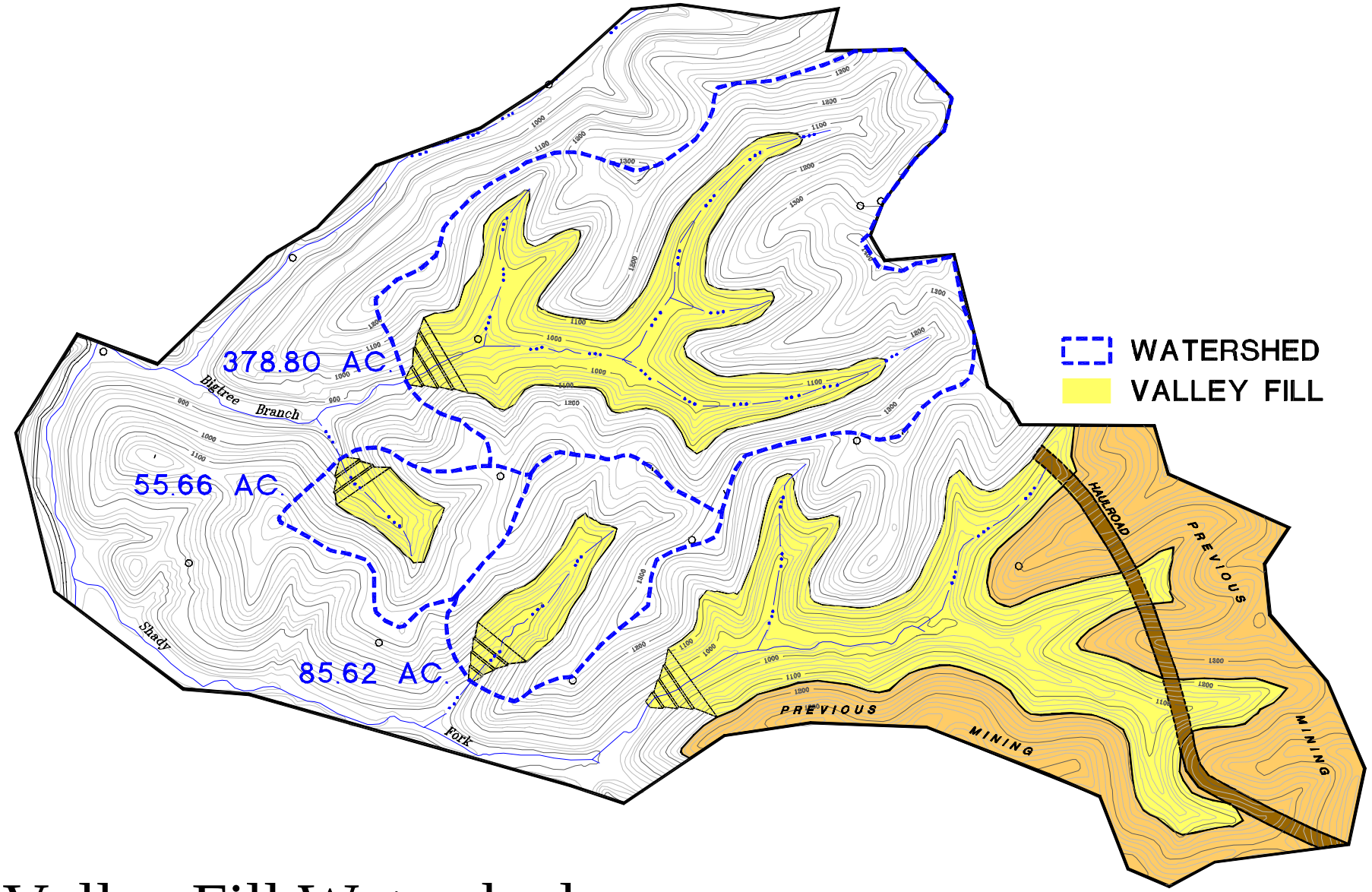
Sediment Control Location

Sequence of Construction

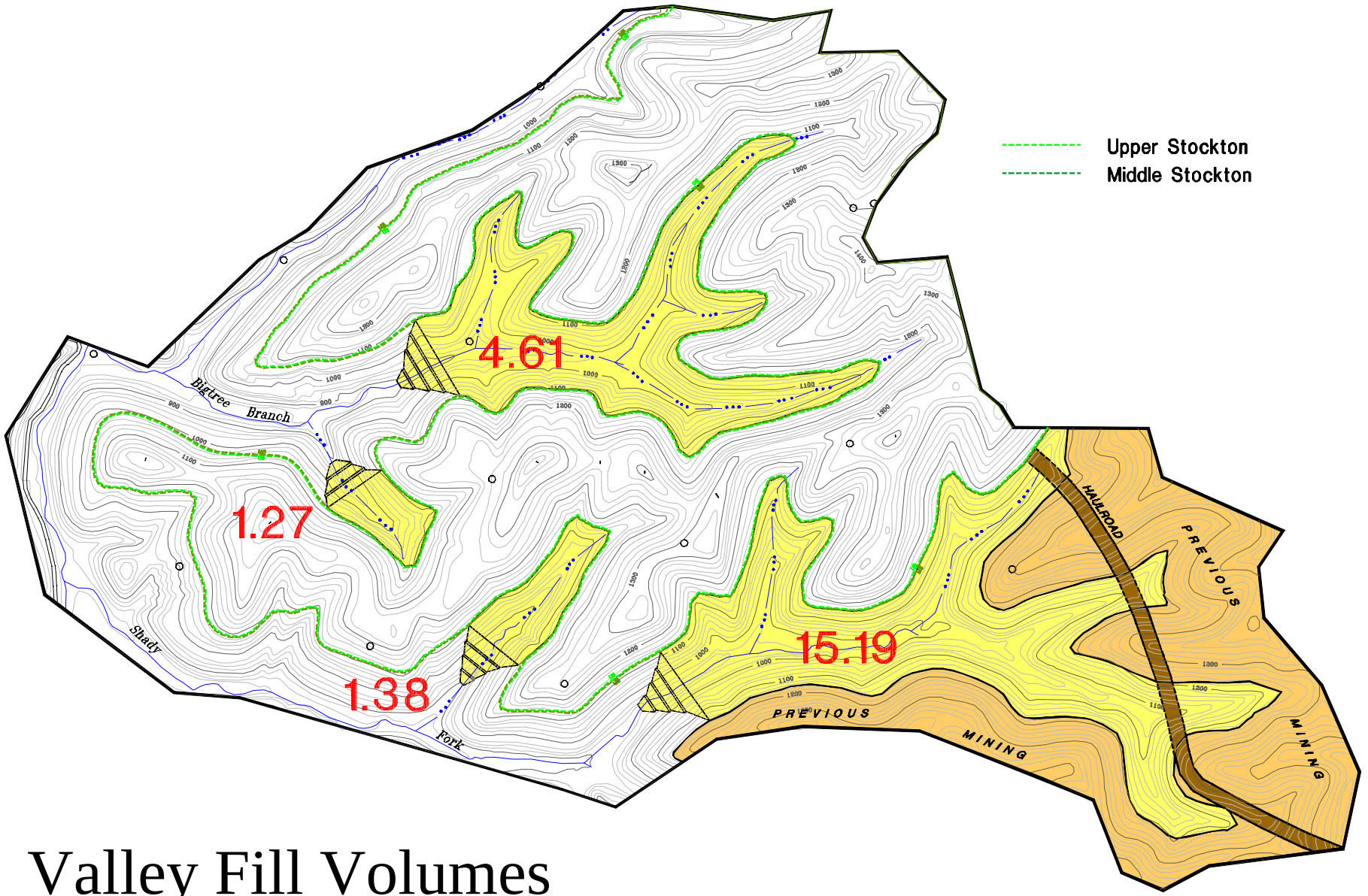
Environmental Factors

Aquatic Habitat

- Benthic Survey
- Stream Area Measurements
- Mitigation/ Compensation
- No Practical Alternative Demonstration



Valley Fill Watersheds



Valley Fill Volumes (MMCY)


3 28 98

Special Handling Plan

- **Identify Stratum Requiring Special Handling**
  - **Determined By Geologic Investigation**
- **Blending, Isolation, or Encapsulation?**
  - **Decision Generally Based on Potential Acidity Relative to Neutralization Potential**
- **Design Details**
  - **Volume of Potential Toxic Material**
  - **Availability and Volume of Containment or Blending Material**
  - **Drainage (Internal and Surface)**

Operating Plan: Mine Sequence

- **Operating Plan Must Consider**
  - **Logical Starting Point, Stopping Point**
  - **Multiple Seams with Varying Quality**
  - **Different Mining Methods Employed Per Seam**
  - **Overall Reserve Configuration**
- **Develop Detailed "Cut" Sequence by Seam**
- **Contemporaneous Reclamation**
  - **Based on Mining Methods and Equipment**
  - ***NOTE: Smaller Fills, Higher Backfill Conflict with Tighter Contemporaneous Reclamation***

Operating Plan: Equipment Selection

- **Evaluate Each Mining Horizon Based on Particular Characteristics**
  - **Thickness**
  - **Material Type**
  - **Spoil Handling Requirements**
- **Assign Appropriate Equipment to Each Horizon**
  - **Front End Loader / Truck Spread**
  - **Hydraulic Shovel / Truck Spread**
  - **Electric Shovel / Truck Spread**
  - **Dozer Push Spread**
  - **Dragline**

Operating Plan: Blasting Plan

- **Identify Blasting Constraints**
  - **Nearest Protected Structures**
  - **Deep Mines Within 500 Feet**
  - **Strata Requiring Special Handling Within Logical Horizon**
- **Develop General Blast Design For Each Horizon**
- **Determine Applicability of Cast Blasting**

Environmental Factors

- Proximity to Residential Areas
  - Blasting Design
  - Location of Roads
  - Location of Fills
  - Erosion and Sediment Control Design
  - Pit Orientation and Sequence

Post-Mining Land Use Plan

- **Mountaintop Mining?**
  - **Develop Higher and Better Post-Mining Land Use Per SMCRA**
- **Select Post-Mining Land Use: Original or Alternate?**
- **Determine Required Configuration of Regraded Surface To Accommodate Chosen Use**
- **Factors To Consider**
  - **Long-Term Access**
  - **Long-Term Maintenance**
  - **Measures of Success**
  - **Economics**

Regrading / Revegetation Plan

- **Compatible With Post-Mining Land Use**
  - **Land Forms and Drainage**
  - **Types of Vegetation**
- **Regraded Configuration**
  - **Varies Depending On Final Land Use**
  - **Must Be Durable and Stable**
- **Revegetation**
  - **Avoid Non-Native Species**
  - **Must Complement Post-Mining Land Use**

Environmental Factors

Planting Plan

- WV DNR Mining Biologist

Revegetation Plan

Erosion and Sediment Control Plan

Transportation Plan

- Access To Mine Reserve Area From Existing Highways
- Internal Access
- Coal Transport From Site To Processing Plant or Shipping Point
- Coal Transport to Markets
  - Rail
  - Truck
  - River

FINALLY …… Permitting

Regulatory Review
Public Inspection and Comment
Regulatory Approval

Permits Required

WV DEP Surface Mining Permit

WV OWR NPDES 402 Permit

Corps of Engineers 404 Permit

WV OWR 401 Certification

WV DNR Public Land Corporation

SUMMARY

Mining Method Analysis
Coal Reserves

Mining Method Reserve Summary

Seam	Acres Available for Mining				Seam Thickness (feet) Recovered			
	Underground	Contour	Auger	Mountaintop	Underground	Contour	Auger	Mountaintop
Upper Kittanning Rider	-	-	-	-	-	-	-	-
Upper Kittanning (Upper Split)	-	53.10	2.93	72.99	-	5.07	5.07	5.07
Upper Kittanning (Middle Split)	-	53.10	-	72.99	-	1.31	-	1.31
Upper Kittanning (Lower Split)	-	76.58	-	83.70	-	1.41	-	1.41
MiddleKittanning	-	28.14	-	28.14	-	2.47	2.47	2.47
No. 5 Block Seam	97.21	181.90	48.80	382.39	6.37	5.21	5.21	5.21
Upper Stockton Seam	521.52	236.18	64.16	641.40	4.88	4.44	4.44	4.44
Middle Stockton Seam	-	236.18	-	641.40	-	1.35	-	1.35
Coalburg Seam	-	131.61	65.66	757.43	-	1.62	1.62	1.62
Total	**618.73**	**996.79**	**181.55**	**2,680.44**	**11.25**	**22.88**	**18.81**	**22.88**

Seam	Mining Recovery				Wash Yield (with 92% Plant inefficiency)			
	Underground	Contour	Auger	Mountaintop	Underground	Contour	Auger	Mountaintop
Upper Kittanning Rider	-	-	-	-	-	-	-	-
Upper Kittanning (Upper Split)	-	85%	30%	85%	-	75.16%	75.16%	75.16%
Upper Kittanning (Middle Split)	-	85%	-	85%	-	76.70%	-	76.70%
Upper Kittanning (Lower Split)	-	85%	-	85%	-	47.55%	-	47.55%
MiddleKittanning	-	85%	-	85%	-	52.14%	-	52.14%
No. 5 Block Seam	60%	85%	30%	85%	46.43%	70.86%	70.86%	70.86%
Upper Stockton Seam	60%	85%	30%	85%	50.87%	79.10%	79.10%	79.10%
Middle Stockton Seam	-	85%	-	85%	-	83.12%	-	83.12%
Coalburg Seam	-	85%	30%	85%	-	58.71%	58.71%	58.71%

Seam	Specific Gravity				Saleable Tons Available by Mining Method			
	Underground	Contour	Auger	Mountaintop	Underground	Contour	Auger	Mountaintop
Upper Kittanning Rider	-	-	-	-	-	-	-	-
Upper Kittanning (Upper Split)	-	1.28	1.28	1.28	-	299,215	5,824	411,294
Upper Kittanning (Middle Split)	-	1.30	-	1.30	-	80,125	-	110,138
Upper Kittanning (Lower Split)	-	1.51	-	1.51	-	89,554	-	97,880
MiddleKittanning	-	1.67	1.67	1.67	-	69,910	-	69,910
No. 5 Block Seam	1.63	1.35	1.35	1.35	383,191	1,047,266	99,157	2,201,560
Upper Stockton Seam	1.58	1.24	1.24	1.24	1,671,041	1,188,213	113,925	3,226,861
Middle Stockton Seam	-	1.23	-	1.23	-	376,582	-	1,022,693
Coalburg Seam	-	1.34	1.34	1.34	-	193,783	34,122	1,115,242
Total					**2,054,232**	**3,344,648**	**253,028**	**8,255,579**

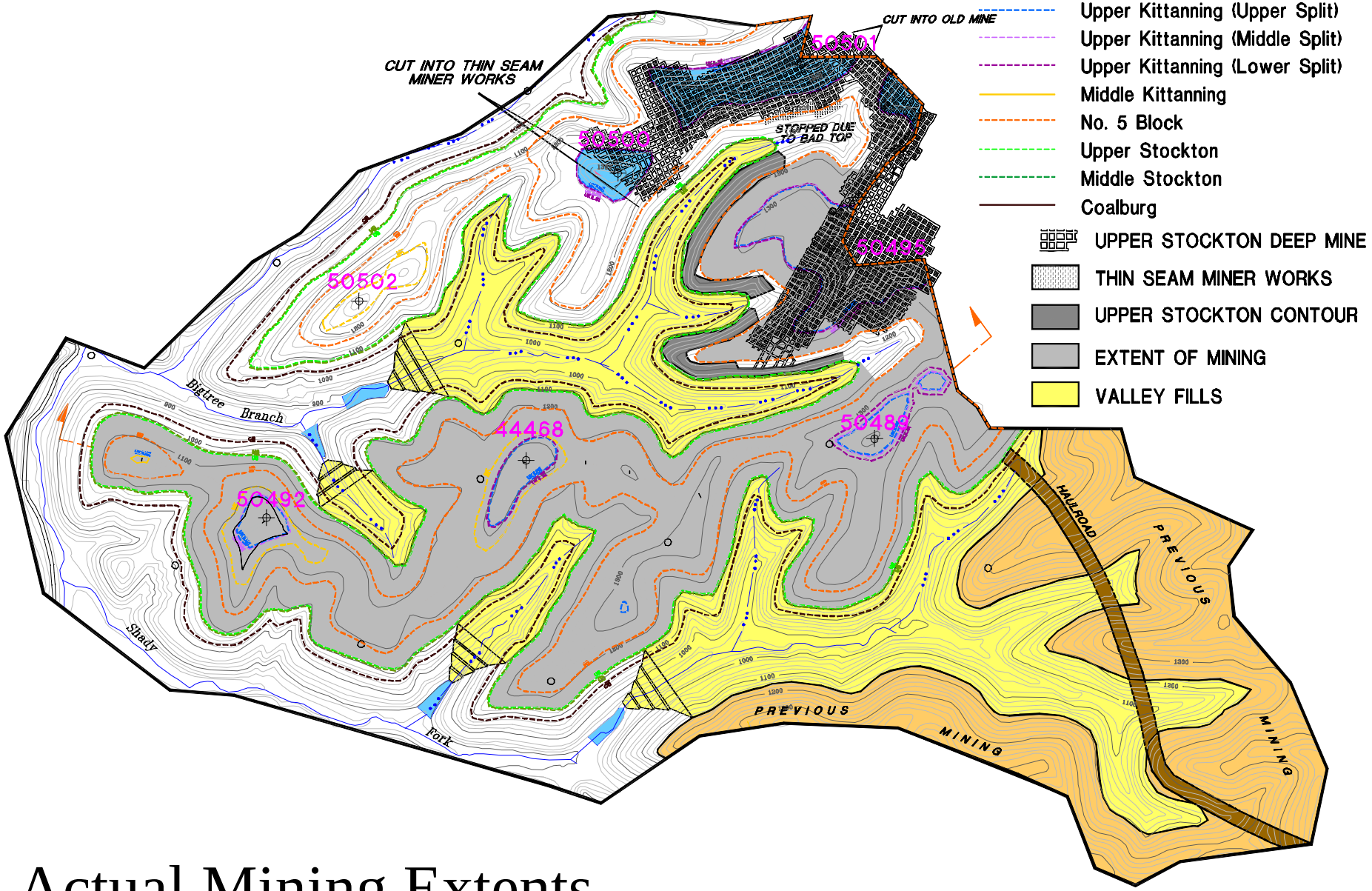
Mining Ratios by Method

CLEAN RATIOS

	BCY Mountaintop	Incr. Ratio Mountaintop	Cum. Ratio Mountaintop
Upper Kittanning Rider	-	-	-
Upper Kittanning (Upper Split)	4,685,843	11.39	11.39
Upper Kittanning (Middle Split)	2,654,562	24.10	14.08
Upper Kittanning (Lower Split)	1,216,455	12.43	13.82
Middle Kittanning	775,018	11.09	13.54
No. 5 Block Seam	32,913,744	14.95	14.61
Upper Stockton Seam	66,635,224	18.79	17.80
Middle Stockton Seam	6,200,739	6.06	16.12
Coalburg Seam	30,764,467	27.59	17.67
	145,846,052		

CLEAN RATIOS (No auger)

	BCY Contour	Incr. Ratio Contour	Cum. Ratio Contour
Upper Kittanning Rider			
Upper Kittanning (Upper Split)	3,272,579	10.94	10.94
Upper Kittanning (Middle Split)	1,064,587	13.29	11.43
Upper Kittanning (Lower Split)	1,063,456	11.88	11.52
Middle Kittanning	775,018	11.09	11.46
No. 5 Block Seam	15,264,354	14.58	13.52
Upper Stockton Seam	15,151,366	12.75	13.19
Middle Stockton Seam	2,369,476	6.29	12.37
Coalburg Seam	3,876,845	20.01	12.81
	42,837,682		



Actual Mining Extents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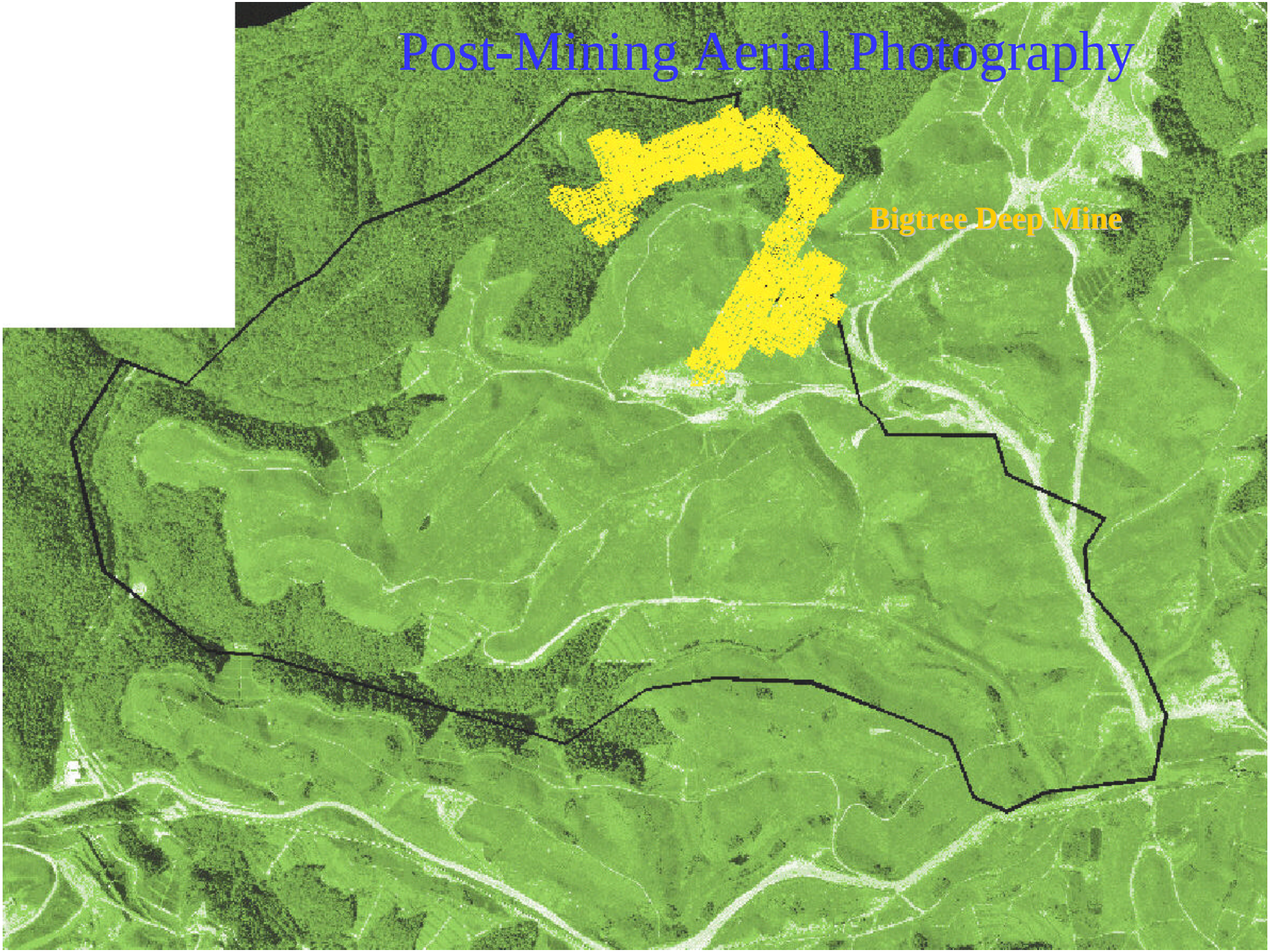
Post-Mining Aerial Photography



Alternative Contour Mining Ratio

	Overburden (BCY)			
Seam/Ratio	**8:1**	**10:1**	**12:1**	**14:1**
Upper Kittanning Rider	-	-	-	-
Upper Kittanning (All Splits)	-	5,099,600	8,937,720	11,561,760
MiddleKittanning	-	-	-	694,200
No. 5 Block Seam	9,258,624	16,805,880	25,707,456	37,059,120
Upper & Middle Stockton	-	9,809,100	-	-
Coalburg Seam	-	-	-	-
Total	**9,258,624**	**31,714,580**	**34,645,176**	**49,315,080**

	Overburden (LCY)			
Seam/Ratio	**8:1**	**10:1**	**12:1**	**14:1**
Upper Kittanning Rider	-	-	-	-
Upper Kittanning (All Splits)	-	6,374,500	11,172,150	14,452,200
MiddleKittanning	-	-	-	867,750
No. 5 Block Seam	11,573,280	21,007,350	32,134,320	46,323,900
Upper & Middle Stockton	-	12,261,375	-	-
Coalburg Seam	-	-	-	-
Total	**11,573,280**	**39,643,225**	**43,306,470**	**61,643,850**

Note: Material swelled 125%

Alternative Contour Mining Ratio

	Backfill (CY)			
Seam/Ratio	**8:1**	**10:1**	**12:1**	**14:1**
Upper Kittanning Rider	-	-	-	-
Upper Kittanning (All Splits)	-	3,651,072	7,380,346	10,296,411
MiddleKittanning	-	-	-	382,719
No. 5 Block Seam	5,714,491	11,772,086	19,478,455	30,222,920
Upper & Middle Stockton	-	6,538,550	-	-
Coalburg Seam	-	-	-	-
	5,714,491	**21,961,708**	**26,858,801**	**40,902,050**

	Excess Spoil (CY)			
Seam/Ratio	**8:1**	**10:1**	**12:1**	**14:1**
Upper Kittanning Rider	-	-	-	-
Upper Kittanning (All Splits)	-	2,723,428	3,791,804	4,155,789
MiddleKittanning	-	-	-	485,031
No. 5 Block Seam	5,858,789	9,235,264	12,655,865	16,100,980
Upper & Middle Stockton	-	5,722,825	-	-
Coalburg Seam	-	-	-	-
	5,858,789	**17,681,517**	**16,447,669**	**20,741,800**